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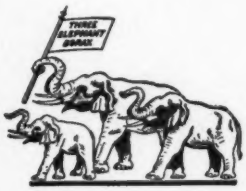

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Better Crops with PLANT FOOD

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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington, D. C.

VOLUME XXVII NUMBER 3

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VOL. XXVII WASHINGTON, D. C., MARCH, 1943 No. 3

Prospective . . .

Plow Pushers

Jeff McDermid

WHEN the Army takes over the crop harvest next summer, the tough old drill sergeant will become the "straw boss' at threshing time. It will be "hay foot, straw foot" for sure. Appeals to the armed forces idling and drilling in domestic camps to harden up with pitchforks instead of bayonets has a lot of sound sense and also a few links of well-seasoned bologna behind it. It has become stylish—in the mode of the moment—to refer to the dearth of extra farm hands as a general and a universal calamity.

This overlooks the fact that some communities are bound to fare better if left to their own devices and ready resources than if some "do-good" welfare committee assumed a self-appointed job of gleaning recruits whose bellies might be more active than their biceps. They would perform greater wonders at sausage stuffing than at silage making.

If these numerous committees on farm labor do not trip each other up in rival flurries to find field hands, most of us will be surprised. In any event they will be doing the most welfare work for the recruits sent from town to farm, because the brisk tasks and long hours of work will build them up and spill a lot of fancy fees for the nerve specialist. The farmer on his side must show a great amount of tolerance and conduct himself like any wartime instructor in necessary arts and crafts—with the extra pleasure of providing a square meal for all who are assigned to his bucolic battalion for strenuous induction to agriculture.

Some happy instances will occur to compensate him for his pains and losses. If the army furloughs some hardy Texas lads to help the northern stockmen,

they can show off some new tricks with the lariat that will save a lot of cow and hog calling and fodder carrying. Some strange burnt marks and brands may appear on hides of Holstein calves in place of ear-tags; and the flocks of turkeys and sheep in Yankeeland will receive some driving hints they never knew existed.

Should any of the colored brethren be quartered in the northern realm at the time when watermelons, roastin' ears, and broilers are ripe for nocturnal transportation, there may be some gnashing of molars among the provident provincials.

TO offset such disadvantage the army should release a squadron of Missouri mules, who fully understand how to get along with a colored man, and whose advent on a push-rake or a grain wagon would release more tractors to the repair shops for the duration.

Should any of our Wisconsin and Michigan teat-yanking specialists be ordered to tamper with the dual-purpose bovines below the M-D line, we may grow alarmed again over the immediate prospects for keen lactic competition from the region hitherto known as the "oleo area." Rations will be weighed and balanced as never before, and the extent of the milk flow possible from a herd in a lean-to shed on the edge of a field of wild lespedeza will cause shudders in the udders of our northern cows.

Has anybody ever before brought to your thoughtful attention this likely chance for topsy-turvy farming when the soldiers start to save the farmer from labor lack? But the best thing about it is that rural workers of the various sections of this broad land will get to know each other better after making contact in this way. Maybe it's just as important for citizens of our own country to appreciate each other's practical problems as it is for us to try social regeneration and salvation among the natives of Tunisia or New Guinea.

Of course one of the grave issues that bobs up when they debate the release of soldiers for farm duty is the one of industrial competition with agriculture. While there are huge areas of America that cannot be regarded as near enough to war plants to affect the result in labor shortages, it is also true that some of the most vital productive regions relied upon to give us the needful dairy, vegetable, and poultry foods are also uncomfortably close to the best-paying factories working triple shifts on huge war orders at "cost plus."

I had occasion last month to test this out through two of our local draft boards. Having noted a newspaper report that out of 146 boys called for induction, 48 of them were from rural routes, it seemed to me worth while to investigate—just to see if these boards were ignoring the mandate issued last fall to conserve farm labor.

Upon presenting my challenge and my list of farm boys to the local board, they quickly assembled the data I wanted bearing on the immediate past employment of these young recruits. Although I was somewhat prepared for what they told me, as our area lies in a factory zone, I was not quite ready to face the figures announced. In short, out of the 48 aforesaid farm boys being called, only four were actually working on farms part time. The rest were in all kinds of urban employment, mostly in the industries that paid good wages on government contracts.

Here the draft boards were stumped. They had to call these ex-farmer boys under the regulation. This stated that boys who had left agriculture without previous permission from the boards, or were not released that way temporarily, were subject to instant classification in the first division for duty. No other alternative offered. Maybe this was unjust and unwise, because it would seem that draft boards should have power to order the boys best fitted for farming to go back to their rural labor or else don uniforms.

Lately Congress has been talking over this same issue. However, thus far most of the debaters have said that

there is no legitimate power that can be exercised to pull men from industrial jobs and send them back to farms.

EVEN if a special power was conferred by Congress under emergency laws, what would be the effect on the boys ordered back to relatively low wages and longer hours behind the cultivator or for loading hay? Resentment probably at least, and perhaps sullen or open defiance of their employers or parents. The morale of the farm would be shattered badly if recruits were obtained in this way, by force and duress.

I do not know why some folks with imagination have not been working on a better system of handling these stay-at-home farm boys during the war. If they had been officially recognized as part of a bona fide land-reserve army, entitled to wear insignia or buttons, some of the mental disturbance among the boys deferred from war duty at the front might have been avoided.

Looking ahead to the end of the struggle, we vision hosts of war-battered farm boys returning to their own hearth and heath. Meanwhile to a great extent the ones left behind without special official recognition—only a "release" credited to them—will perhaps be obliged to face two difficult positions.

First, they will have to listen to the tall yarns and travel tales of the veterans, exploits and adventures galore, tantalizing in their brilliance and valor. Girls and women will idolize them and festoon them with garlands. Second, the returning veterans will be without funds and financial reserves to some extent, and some of them will look with envy and no little malice at the accumulations of cash derived from wartime poultry, pork, and dairy prices. Part of the latter trouble can be averted individually by family care in handling income and estates, so that the war heroes will get their rightful share upon returning. But we must take these conditions into consideration so that the boys who do yeoman service at home afield may not be discounted or undervalued by comparison with the ones who either enlisted or were drafted.

But when we turn to the case of the farm boys who spend their energy these days in important war factory work instead of planting and harvesting, it unfolds a new set of problems in the social scheme. No doubt returning rural veterans will place some of the industrial workers in a special class for analysis—especially those who benefit by extra high wages and bonus plans and who have joined up with labor unions dominated by ironclad boss rule.

They will often forget the fact that their rural brethren produced the guns and ammunition which helped the warriors to win. They will be far more resentful toward them perhaps than toward other boys who stayed on farms at wages more like those paid to soldiers.

Here in this very industrial exodus from rural communities to factory towns, shown so plainly by recent population checks, we have an army of men and women leaving agriculture and livestock raising to punch the time clock and profit by the payroll.

Sometimes, of course, the agreement to desert the farm for the oasis of war employment was previously understood between members of the farm family. Gains derived from such employment at wage rates far beyond the best returns at "parity" in agriculture are to be absorbed into the upkeep and improvement of the homestead, after ex-

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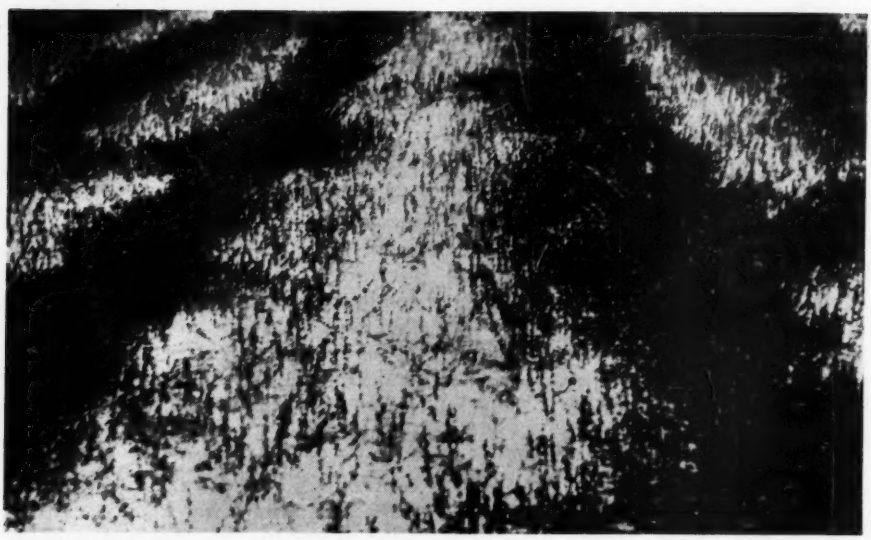


Lespedeza is not a poor land crop. The corn preceding lespedeza received 200 lbs. of a 2-12-6 fertilizer in the row at planting. The lespedeza in and near the corn rows is making a good growth while that in between the rows is not making any growth.

Lespedeza Is Not A Poor Land Crop

By A. L. Grizzard

Agronomist, Va. A. & M. College, Blacksburg, Va.

IT is a well-known fact that the annual lespedezas are adapted to a wide variety of soil and climatic conditions. It is true, also, that lespedeza on account of its tolerance to soil acidity and its strong feeding habits can produce a profitable crop on soils on which alfalfa and red clover would fail. Faulty interpretations of these facts during the early use of the crop led people to make the erroneous statement that "the lespedezas would grow as well without lime and fertilizers as they would with them."

The fallacy of this statement led many farmers to believe that lespedeza required very much less plant food to produce a ton of hay than is required to produce a ton of alfalfa or red clover hay. Even though lespedeza has the ability to utilize plant-food elements which are not available to other legumes, it does, nevertheless, require just as much plant food to produce a ton of hay as is required to grow a ton of alfalfa or red clover hay.

It takes no argument to show that the annual lespedezas remove large, in fact very large, quantities of plant food from the soil. Analyses of alfalfa, red clover, lespedeza, and other hay crops, when converted into fertilizer equivalents, show that these crops are heavy users of plant food. The figures given in table 1 show that a two-ton crop of alfalfa hay removes from the soil plant food equivalent to 194 lbs. of muriate of potash, 97 lbs. of super-

phosphate, and 143 lbs. of ground limestone.

The same quantity of lespedeza hay removes 144 lbs. of muriate of potash, 87 lbs. of superphosphate, and 99 lbs. of ground limestone.

The removal of nitrogen by these crops is particularly striking. Granting that they were inoculated with virulent organisms and gathered two-thirds of the nitrogen from the air (the amount generally attributed to be gathered from the air when legumes are inoculated) the alfalfa removed 196 lbs. of nitrate of soda equivalent from the soil while lespedeza removed 171 lbs. These figures clearly show that lespedeza removes very large quantities of plant food from the soil, especially potash and phosphoric acid. It is evident, therefore, that lespedeza must be fertilized liberally with potash and phosphoric acid to prevent it from reducing the fertility of the land.

Table 1.—The Amount of Plant Food Removed from the Soil by Crops Expressed in Fertilizer Equivalents

Crops	Amount	Sodium nitrate (16% N)	Superphosphate (20% P_2O_5)	Muriate of potash (50% K_2O)	Ground limestone (90% $CaCO_3$)
		Pounds	Pounds	Pounds	Pounds
Alfalfa hay	2 tons	588	97	194	143
Red clover hay	2 tons	473	83	152	121
Lespedeza hay	2 tons	513	87	144	99
Pasture	2 tons	720	133	186	66
Timothy	2 tons	248	74	131	27
Corn	50 bu.	270	90	22	1
Corn stover	2800 lbs.	164	30	112	32

Interest in the lespedezas in Virginia was stimulated by the introduction of the Tennessee No. 76 variety by the Tennessee Station in the early 1920's, and the Kobe and Korean varieties by the U. S. Department of Agriculture a few years later. The chief advantage of the newer annual varieties of lespedeza is that they grow much taller than common lespedeza and are therefore better suited to hay production. The earliness and high seed-producing capacity of Korean lespedeza are very desirable advantages.

The increase in acreage of lespedeza in Virginia has been phenomenal. Only 5,000 acres of lespedeza were grown for hay and 2,000 acres for seed in 1931. The acreage had increased to about 160,000 acres for hay and 30,000 acres for seed in 1941. These figures do not include the large additional acreage sown in pastures. Hence, regardless of some of its recognized limitations, lespedeza is one of the most important soil-improving forage plants introduced into Virginia within the past hundred years, and one that has had a profound and beneficial effect on Agriculture in Virginia, particularly in the eastern half of the State.

The annual varieties of lespedeza are used principally for pasture, hay, and soil-improving crops. They are valuable in pastures and meadows because they make their greatest growth in midsummer at a time when most of the other pasture plants have reached a semi-dormant stage. Although these annual plants must come back from seed each year, they make seed close to the ground; and after becoming well established, they will persist in pastures and meadows as long as conditions remain favorable to their growth.

Other reasons why annual lespedezas are important in pastures and meadows are their wide adaptability to different soil conditions and their ability to grow on spots where other legumes fail, thus bringing into production practically all parts of the pasture area. For these

Lespedeza hay on a well-fertilized field in Southwest Virginia.

reasons, lespedeza is recommended for most new pasture and meadow seedings. The grasses should be seeded in the fall and lespedeza the next spring. It may also be seeded profitably in old permanent pastures where it does not already exist. The one exception to this rule is where a good sod of bluegrass and white clover already exists.

As hay crops, annual lespedezas are not logical substitutes for perennial and biennial legumes such as alfalfa and red clover where soil and climatic conditions are favorable for the latter. For good results, alfalfa requires a soil reaction of pH 6.5 to 7.0, and red clover, 6.2 to 6.5. Neither of these crops can be depended on to produce paying crops on land that is too poor to produce at least 35 to 40 bushels of corn to the acre. Annual lespedezas, on the other hand, will grow well on soils with a reaction of pH 5.5 to 6.0, and may make paying crops of hay on soils which are not capable of producing more than 25 to 30 bushels of corn to the acre. On poor soils, lespedeza, along with liberal quantities of lime and fertilizers, should be used as a soil-improving crop as a means of building up the soil so that biennial and perennial legumes may be used in the rotation.

Experiments were conducted at Glade Spring in southwest Virginia for a period of 7 years, at Appomattox in the Piedmont for 4 years, at Staunton in the Shenandoah Valley for a period of 2 years, and at Williamsburg in eastern Virginia for 5 years, to determine the most desirable dates for seeding

(*Turn to page* 50)

TABLE 2.—THE EFFECT OF LIME ON THE YIELD OF DIFFERENT VARIETIES OF ANNUAL LESPEDEZAS

Fertilizer treatments	Korean		Kobe		Tenn. No. 76		Common	
	With lime	Without lime	With lime	Without lime	With lime	Without lime	With lime	Without lime
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Not fertilized	4333	2517	3299	2351	3021	2278	3277	2143
Fertilized [1]	5184	4301	4557	4004	4065	3409	4253	3665

[1] Average of 4 different fertilizer treatments which are shown in table 3.

Ohio Farmers Try Plow-Sole Fertilizers

By D. F. Beard and J. A. Slipher
Columbus, Ohio

FOR centuries farmers have plowed under combinations of plant nutrients in the form of farm manures, residues, and sods. The common method of using chemical fertilizers consists of placing them near the seed in the upper portion of the plow-layer. Even though the current rates of fertilizing crops are only fractional when compared with the crops' needs for nutrients or with the volume of nutrients contained in applications of manure or good legume sods turned under, they are the ceiling rates for usual hill or row placements. The question then naturally arises as to whether heavier amounts of fertilizers can be used in the lower portion of the plow-layer.

Farmers are searching for a more advantageous placement of fertilizers for their crops. They desire:

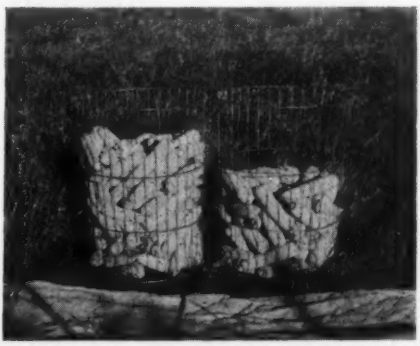
A. To condense into a single operation (or at least two) the labor and time incident to the current practice of making three or four small applications during the crop rotation.

B. To supplement the accepted planter-placed fertilizers on row crops with additional fertilizers in the root zones.

This additional fertilization would help crops escape the low efficiency of shallow applications during dry seasons; would eliminate the weed hazard set up in wet seasons when nitrogen-containing fertilizers are spread in the upper portion of the plowed soil; and would avoid the danger of wasting applied nutrients caused by sheet erosion on sloping land.

The possible advantages of placing nutrients deep in the soil are (1) the plow-sole is more consistently moist during the growing season than the upper portion, favoring an uninterrupted rate of solution of the nutrients; and (2) the greater mass of the corn roots lies below the upper plow-layer.

During 1942, several corn growers in Ohio ventured to try the plowing-under placement of fertilizers. These trials were located in Hancock, Wyandot, Wood, Madison, and Preble counties. The purpose of their undertaking was to determine whether large applications of complete fertilizer plowed under, coincident with the customary hill or row applications, would step up the yield. No attempt was made to compare one method of fertilization with another or to compare responses to individual nutrients. On most of the farms reported herein the use of commercial fertilizers in the past has been



Comparative yields from area on Farm 4 where 525 lbs. 10-10-10 were plowed under following soybeans. Yields 68 bu. and 49 bu. per acre respectively. Both areas fertilized with 100 lbs. 2-12-6 in hill at planting time.

higher than commonly practiced, and the fertility of the soil is above the average for their respective communities.

The desired placement of the fertilizers on the bottom of the open furrow was not accomplished because the special plow attachment for this placement was not available. The applications were actually made by drilling the material (using a grain drill) onto the surface of the soil and then plowing. This resulted in the fertilizer being mixed from the bottom to the top of the plow-layer, rather than being placed exclusively at the bottom of the furrow.

On two farms located in Hancock and Wyandot counties, applications of an 8-8-8 fertilizer were plowed under at the rate of 500 lb. to the acre on fields used for the production of single-cross seed.

On Farm No. 1 the soil was dark colored and of good productivity. A crop rotation of corn-wheat-clover had been followed on the field used for the comparison. Being higher than the yield commonly obtained in the production of inbred line or single-cross seed, the increase from the plowed-down fertilizer in addition to the fertilizer in the drill rows was impressive, as shown in table 1.

TABLE 1.—FARM 1

Fertilizer Treatment	Seed Yield of Inbred Os426
Lb. per acre	Lb. per acre
8– 8–8 500 plowed down 2–12–6 200 in drill row	1552
None plowed down 2–12–6 200 in drill row	1212
Gain for plow-down lb..... %.....	340 28%

Farm No. 2, in Wyandot county, also had a dark colored but heavier textured soil (silty clay loam). For the past three years the field had been in alfalfa, the last season being devoted to grazing. To the sod was added a reinforcement of 10 tons of manure per acre. The "plow-down" goods was again an 8-8-8, and a 2-12-6 grade was applied in the drill row with the planter. Unfortunately, in early August a hailstorm damaged the immature crop. The outcome appears in table 2. This is the only plot in the series that failed to show a significant increase for the plowed-under fertilizer.

TABLE 2.—FARM 2

Fertilizer Treatment	Seed Yield	
	Inbred O7	Inbred Hy
Lb. per acre	Lb. per acre	
8– 8–8 500 plowed down 2–12–6 125 in drill row	1696	2310
None plowed down 2–12–6 125 in drill row	1856	2376
Loss (Crop damaged by hail).	−160	−66

On Farm 3, in Wood county, the field contained two types of soil, a dark-colored clay loam and a black sand. A fair legume seeding obtained in a preceding crop of wheat was turned under. A 3-18-9 fertilizer was applied in the drill row at an acre-rate of 175 lb. Yields were obtained on October 1, a few days following the first killing frost of the season. The moisture content of the harvested corn was about the same under both treatments. Reported yields are in terms of shelled corn at 15½% moisture. Although the yield level proved high, the added response from the plow-down treatment stands out.

Some thought-provoking observations were made on a fourth farm in Madison County where the fertilizer was plowed under in a field consisting of four blocks, each with a different cropping history. These blocks had been in various crops the preceding

(*Turn to page* 48)

More Smokes Per Acre

By Joe A. Elliott

Agricultural Extension Service, Knoxville, Tennessee

The Love brothers, L. H. and V. C. of Greene County, Tennessee, discuss burley tobacco culture with County Agent W. P. Davidson.

WITH less land, labor, and materials available for wartime tobacco production, it is more important than ever that we squeeze the last pound of quality leaf out of every acre.

When a group of growers put the question of fertilization to Frank S. Chance, superintendent of the Greeneville Tennessee Experiment Station, he modestly answered it this way: "We didn't know anything about fertilizing tobacco, but we asked the soil questions. The soil told us through the warehouseman's weight and sales slips what it wanted."

This was Mr. Chance's way of saying they tried out various amounts and combinations of plant nutrients on different soil types over a period of years, and measured results in terms of pounds and dollars.

And now for some of the things the soil has told Mr. Chance and his associates during the last 8-10 years. First of all, their results clearly point to the desirability of using balanced supplies of nitrogen, phosphoric acid, and potash if a quality leaf is wanted. The burley plant's needs, particularly for nitrogen and potash, are much higher than many fertilizer manufacturers have recognized in the past in making up their formulas for tobacco.

Summarizing experimental work in tobacco fertilization in the Tennessee Station's Annual Report, Mr. Chance states:

"Where no potash was added, crops

were poor and the growing plants showed its deficiency. The tests indicate that where no manure is used, 60 pounds of K_2O per acre is sufficient to produce optimum yields, and that when 90 pounds is applied, yields may be slightly reduced. The additional amount of potash may improve the quality, but not to a marked degree. It may be noted also that when potash is added, even to the extent of 240 pounds of K_2O per acre, the yield may not be reduced to any greater extent than when only 90 pounds is applied.

"Nitrogen has proved to be a vital factor in the production of burley tobacco, when used with or without manure. A mixture of nitrate of soda and sulphate of ammonia has been used as a source of nitrogen in these tests. In most cases 18 pounds of N per acre has been used. It has always been apparent that where this amount was increased to 30 pounds per acre, both quantity and quality of leaf were improved. Even in the presence of 15 tons per acre of good-quality manure, 18 pounds of N increased yields and did not injure quality.

"Results of these tests show that manure is one of the most important factors in producing high-quality leaf. Comparisons of plots receiving 5, 10, and 15 tons of manure per acre show that the plots produced, in marketable leaf, 885, 1268, and 1487 pounds per acre respectively. The improvement in quality was almost as marked as the increase in yield.

"Fertilizer tests have been conducted on 3 types of soil common to the burley area—on Decatur soil for 8 years, on Shackleton silt loam for 5 years, and on Nolichucky silt loam for 3 years. In general the data from these tests on the different types of soil point in the same direction as to potash and nitrogen needs. All of the soils are poor in phosphorus. Shackleton is so poor that a profitable crop cannot be grown without the addition of this element. Nitrogen and potash are of little value in any of the soils without the addition of phosphoric acid."

Chlorosis or mottling, indicating potash starvation, begins at the top of the older leaves.

Recent research with other crops indicates that placement of fertilizer has considerable bearing on its availability. In Tennessee no data on this with tobacco are available. Many of the better growers in the State put fertilizer in the row by using a corn drill having a fer-

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Fig. 1. These alfalfa plants exhibit severe boron deficiency. Note the distinctly yellow tops even though the other leaves have a dark green color. A shortening or rosetting of the tops also is seen in places.

Boron and Potash for Alfalfa in the Northeast

By A. F. Gustafson
Cornell University, Ithaca, New York

OVER a period of several decades, Northeastern farmers have suffered considerable losses as a result of certain disorders, often called diseases, of alfalfa, fruits, and vegetables. The disorder of alfalfa, called "yellow top," was described by Stewart, French, and Wilson [1] at Geneva, New York, in 1908, Fig. 1. Thirty years later, McLarty, Wilcox, and Woodbridge [2] cured "yellow top" by an application of boron. The following year, Willis and Piland [3] reported improvement in the growth of alfalfa as a result of an application of boron. Now, yellow top is known to result from deficiency of available boron in the soil, or from conditions that interfere with normal functioning of boron in the plant. Calcium induces boron deficiency in certain cases, but how is not clear. Kitchen, in the November 1942 number of this Journal, indicated the areas in the United States, including the Northeast, in which boron deficiency for one or more crops is definitely known.

One of the earliest, if not actually the first, to use borax for alfalfa in this section was Ray Bender, County Agricultural Agent in Essex County, New York. He put on 10-, 15-, and 25-

[1] Stewart, F. C., G. T. French, and J. K. Wilson. *Troubles of Alfalfa in New York.* New York Agr. Exp. Sta. Geneva Bul. 305, 1908.

[2] McLarty, H. R., J. C. Wilcox, and C. G. Woodbridge. *A Yellowing of Alfalfa Due to Boron Deficiency.* Sci. Agr. 17:515-517. 1937.

[3] Willis, L. G., and J. R. Piland. *A Response of Alfalfa to Borax.* Jour. Amer. Soc. Agron. 30:63-67. 1938.

pound-an-acre applications of borax to newly established alfalfa in 1937. The borax produced marked increases in yield of hay and materially extended the life of the stand. The use of potash also proved beneficial to alfalfa on the sandy soil selected by Bender for this test.

Many New England agronomists have already reported good results from the use of boron and potash on alfalfa. Borax was applied with and without the other trace elements on alfalfa by the Agronomy Department in New York in 1940. In the fall of that year and in 1941, Colwell,[4] working on a boron fellowship. applied borax and potash to alfalfa that showed signs of boron or potash deficiencies in a number of New York counties. The tests were designed to indicate whether boron or potassium or both were deficient. In some of these tests, the quantity of potash applied proved inadequate to supply the needs of alfalfa. In other tests, applications of 400 and 800 lbs. of muriate of potash an acre produced such marked increase in yield of alfalfa hay that the farmer, on whose land this test was located last fall, treated alfalfa on an entire field of the same type of soil (a loam) with 400 lbs. of muriate to the acre.

[4] Colwell, W. E. *A Biological Method for Determining the Relative Boron Content of Soils and Chemical Studies on Certain Metaborates.* Unpublished thesis, Cornell Univ. 1942.

Although few yield data were taken, Colwell's work indicated that an application of 20 to 40 lbs of borax to the acre is sufficient for alfalfa on some soils in New York. Up to 100 lbs. an acre, evenly distributed, was not injurious to alfalfa nor did such heavier applications prove more beneficial than 40 lbs. an acre. It should be stated, however, that borax does not increase alfalfa yields on all New York soils.

The oat crop is particularly sensitive to boron injury, when borax is applied with the fertilizer in direct contact with the oat seed. In a test in Franklin County, New York, borax markedly retarded the germination of oats. When the grain was mature, however, one could not distinguish between the borax-treated and the no-borax plots on the basis of the appearance of the grain. It appears, therefore, either that boron simply delayed germination or that the treated oats tillered to such an extent as to produce a good stand and what appeared to be a satisfactory yield of grain.

The effect of borax (plots in duplicate) on the yield of a mixture of oats and barley was determined on the productive Honeoye silt loam on the Soil Conservation Service Experimental Farm near Marcellus, New York. Part of the farm is used for agronomic experimental work by the Agronomy Department of the Cornell University

Fig. 2. Borax applied July 11, 1942; alfalfa harvested Aug. 25, 1942. Borax, at the rate of approximately 30 lbs. an acre was used for piles 2 and 3. No borax was used for 1 and 4, which serve as checks against the borax treatment.

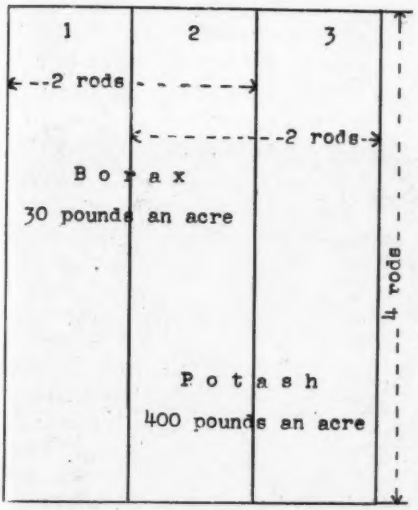


Fig. 3. Plan of a simple test for need of boron and potash on alfalfa or clover. Copper, manganese, and zinc may be applied across these treatments to learn whether these "trace elements" are needed. It is assumed, of course, that all other needs of alfalfa or clover have been supplied.

Agricultural Experiment Station. The yield of grain without borax was 1,860 lbs. to the acre. With 20 lbs. of borax to the acre, the yield was 1,420 lbs.; with 40 lbs. 1,170 lbs.; and 100 lbs. of borax, 420 lbs. of grain to the acre. From these meagre data, one may draw only tentative or provisional conclusions. For the present, however, it may be stated definitely that borax should not be applied in direct contact with oat and barley seed. If needed for alfalfa, boron may be broadcast after the nurse-crop grain has been harvested.

In applying borax on alfalfa in a vegetative state, care should be exercised to distribute it uniformly. Temporary burning of both alfalfa and clover on light soils has been observed in parts of fields to which 60 lbs. of borax an acre were applied. This damage was caused by the absorption of boron through the roots of the plants. Had the distribution been uniform, it is not believed that any damage would have been produced.

This observation, however, suggests that borax be applied for alfalfa before growth begins in the spring or immediately after the first or second cutting of the crop, and before much growth has been made. However, with care, borax may be put on safely at any stage of growth. The plants should be dry so that little borax adheres to the leaves. Upon going into solution in dew or rain water, adhering crystals of borax may cause temporary burning of the leaves. Mixing borax with moist sand or other inert material and sowing it by hand proved entirely successful on $\frac{1}{20}$-acre test plots. No burning was noted in any case. For larger areas, application of borax alone by means of seeders of the cyclone, the wheelbarrow, or other types appears feasible.

Application in Fertilizers

In the case of larger areas or entire fields that require additional treatment for alfalfa, borax may be mixed with such material and applied simultaneously. On land known to be deficient in both potash and boron for alfalfa, borax may be mixed with muriate of potash and applied in one operation. Or if superphosphate is to be used as a top-dressing, although not the best way, borax may be mixed with the phosphate and the mixture put on with the ordinary fertilizer distributor.

The writer spent July and parts of August and September 1942 in northern New York; July, mainly, in St. Lawrence County. The phase of the work to be reported on here was a study of hay crops, particularly alfalfa and clover. Up to the beginning of this study, no specific difficulty with these crops, except potash deficiency, had been reported.

The first crop of alfalfa had not been harvested from many fields. In one of these fields, that of Ralph Wallace, a mild case of yellow top was noted. Soon thereafter, yellow top was found on the second growth in many fields, particularly on Madrid loam. (Madrid loam is well drained and contains an abundance of calcium carbonate in the sub-soil and often in the surface as

(*Turn to page* 42)

Alfalfa is not only good feed, but it is a legume.

Indirect Nitrogen Fertilization

By Henry C. Harris
Agronomist, University of Delaware, Newark, Delaware

THE use of nitrogen in war industries has led to a shortage of it for fertilizer purposes. In order to meet this shortage farmers are urged to utilize wherever possible all nitrogenous by-products on the farm even though they may contain only a small amount of nitrogen. This means that farm manure should be conserved and utilized to the fullest extent; that straw, leaves, and grass should not be burned but be incorporated in the soil; and that any other type of waste material containing nitrogen should be utilized. By doing things of this type, the shortage will be decreased.

The most important of these by-products is farm manure. Its value will depend largely on what is lost in the following ways: loss of the liquid portion, leaching, and volatilization of ammonia nitrogen.

Roughly half of the value of farm manure is in the urine. Most of the readily available nitrogen and practically all the potash of manure is in this form. It is, therefore, of great importance that the liquid portion be conserved. The floors in stalls and storage pits should be tight so that it will not leach out, but possibly the most important thing to do in this respect is to use an abundance of absorptive litter for bedding in the stalls. This will retain the liquid part and prevent it from runing off and being lost.

If the manure is thrown outside and exposed to the rain or the water from the roof of the barn, the soluble material in the manure will be lost through leach-

ing, and the value of the manure greatly decreased. Every effort should be made to prevent leaching of the manure.

Sometimes much of the value of manure is lost through volatilization of the ammonia nitrogen. Soon after the manure is produced, bacteria begin the process of converting the nitrogen of the manure into ammonia compounds which are volatile. As the process continues, the loose manure becomes more compact and there is a different type of bacterial action, and less ammonia compounds are produced. The loss of this volatile ammonia from the loose fermenting manure decreases its value. It has been found that the addition of superphosphate to the manure reacts with the volatile ammonia compounds and produces ammonium sulfate which is not volatile. In that way this addition decreases the loss of the ammonia from the manure. In addition to saving nitrogen, the added superphosphate tends to balance the low content of P_2O_5 in manure. (The analysis of manure is about 0.5% N, 0.25% P_2O_5, and 0.5% K_2O.) The usual amount of superphosphate applied in the gutters is one or two pounds per cow. Broiler and other types of manure could be treated in a similar manner.

Caustic forms of lime(5) when used on fresh manure have decreased the loss of nitrogen, but when applied to fermenting manure, rapidly liberate the nitrogen. For that reason the treatment of manure with lime is not generally recommended.

Probably the ideal time to spread manure upon the land would be as soon as it is produced, but in most cases it has to be stored. As pointed out, compaction has a tendency to change the type of fermentation with the production of less volatile ammonia compounds. If the manure has to be stored, possibly the best thing to do is to thoroughly compact it, keep it moist but not wet, protect it from leaching, and do not move it, which would again loosen the manure.

After the nitrogen is in the soil, it should not be allowed to leach out or be lost through erosion. This can be prevented in most cases by keeping a growing crop on the soil. The coverage largely prevents the erosion, and the growing crop takes up the available nitrogen and prevents it from leaching out in the soil. If the cover crop is

A good crop of soybeans helps to decrease the nitrogen shortage.

plowed under, the nitrogen secured by it from the soil will be retained and become available for future crops. Furthermore, the plowing under of the green manure tends to maintain an active supply of organic matter in the soil, and that is of primary importance in any soil management program.

The utilization of all nitrogenous products and the prevention of the waste of the nitrogen thus applied to the soil has been greatly emphasized, but there is another side of the picture which has not received as much attention. It is what might be called indirect nitrogen fertilization. Indirect nitrogen fertilization may be defined as doing anything which will increase the amount of nitrogen fixed in the soil by leguminous and other free fixing organisms, or increase the efficiency of the nitrogen applied or the nitrogen already in the soil. It may be just as important as applying nitrogen directly.

Minerals play an important part in this connection, and more emphasis should be given to that point.

Practically all of the nitrogen in the soil is in the form of organic matter. Before it is utilizable by plants it has to undergo decomposition, ammonification, and nitrification. The principal factors which affect this transformation by microorganisms of the nitrogen from the complex forms to the available forms are aeration, nature of the organic matter, and mineral supply. Aeration is largely a matter of drainage, and this means that good drainage is necessary for the proper functioning of these organisms as well as the normal development of the growing crop. If the organic matter is woody or high in carbon in relation to nitrogen, the available nitrates will be produced more slowly. In very acid soils, even though they are well supplied with organic matter, nitrates will not be produced generously, and thus crops will suffer from an inadequate supply of nitrates even though the total amount of nitrogen in the soil may be sufficient. Lime, and to a lesser degree, phosphorus and potassium, encourages this transformation of nitrogen from the unavailable organic form to the available nitrate form.

Leguminous crops are always important because of their high nutritional value, but they are especially important at this time because the organisms which grow on the roots of the plants gather nitrogen from the atmosphere and fix it in the nodules formed on the roots. In that way the nitrogen content of the soil is increased. Few leguminous crops do well on a soil without a liberal supply of lime, phosphorus, and potassium. The composition of leguminous and non-leguminous crops varies considerably, but Table 1 will illustrate in a general way the difference in the two types of plants.

TABLE 1.—POUNDS OF ELEMENT IN 1,000 POUNDS MATERIAL

(From 20th Edition Feeds and Feeding by Morrison)

	Calcium	Phosphorus	Potassium	Magnesium	Nitrogen
Alfalfa hay	14.3	2.1	20.2	2.6	23.5
Red clover hay	12.1	1.8	15.8	2.8	18.9
Timothy hay	2.7	1.6	13.6	1.4	9.9
Oat hay	2.2	1.7	10.9	1.6	13.3

The legumes, alfalfa and clover, take more minerals from the soil than the non-legumes, timothy and oats; and unless these minerals are well supplied, the leguminous crops are not going to thrive, and for that reason are not going to add as much nitrogen to the soil as otherwise they would.

The quantity of nitrogen added to a soil by growing a leguminous crop undoubtedly is variable, but Table 2, compiled from the results of Lyon and

Piles of broiler manure leached by rain.

Bizzell (3), will give some indication.

These crops were harvested and the fixation figures include the nitrogen removed in the crops. The soil in the soybeans, field beans and rye, barley or oats experiment was lower in nitrogen than at the beginning of the experiment because more was removed in the harvested crop than was added, but in all the other cases there was an average yearly increase in the soil of from 40 to 60 pounds of nitrogen per acre. All kinds of results have been reported, depending on the conditions. In any case, the amount of nitrogen added to the soil by legumes is related to how well they grow, and they will not grow well unless they are generously supplied with minerals. For that reason, state experiment stations generally recommend for legumes liberal amounts of lime, phosphorus, and potassium.

There is a certain amount of nitrogen taken from the atmosphere and fixed in the soil by organisms not associated with legumes. How much this amounts to is not very definitely established. The results given above indicate a nitrogen fixation of 17 lbs. per acre per year, where barley, rye, and oats were grown without legumes. Lyon and Wilson (4)

(*Turn to page* 45)

TABLE 2.—NITROGEN FIXATION BY LEGUMES

Crop	Nitrogen of soil, gain, or loss, in 10 years, pounds per acre	Average annual nitrogen fixation, pounds per acre
Red clover alternated with rye or barley	532	146
Alsike clover alternated with rye or barley	595	136
Alfalfa alternated with rye or barley	607	241
Sweet clover alternated with rye or barley	420	163
Soybeans alternated with rye or barley	−42	102
Field beans alternated with rye or barley	−100	57
Rye, barley, or oats	−52	17
Alfalfa each year	505	268

Winning the Battle For the Land

By T. S. Buie

Regional Conservator, Southeastern Region, Soil Conservation Service, Spartanburg, S. C.

"What we need today is productive conservation to help us produce more and produce it more efficiently. Our conservation program must be adaptable to the needs of the hour, or we must make it so. Conservation must take an aggressive role in the war effort."

—Secretary of Agriculture Wickard in his Annual Report for 1942.

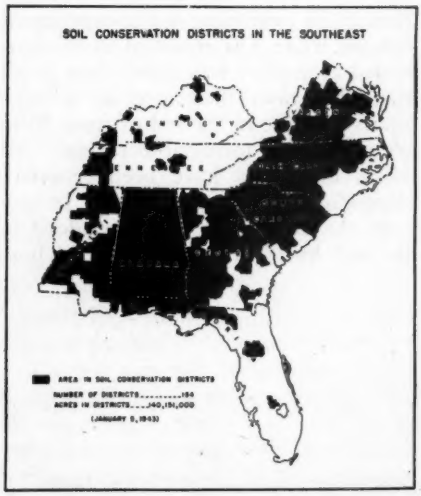
THE total resources of the United States are pledged to winning the war and winning it as quickly as possible. In an endless stream airplanes, tanks, machine guns, bombs, and other instruments of war are pouring from factories that during peace time produced automobiles, tractors, typewriters, and other goods for civilian use.

Converting manufacturing plants for wartime production was accomplished in most instances practically overnight, demonstrating typical American ingenuity under stress of an emergency.

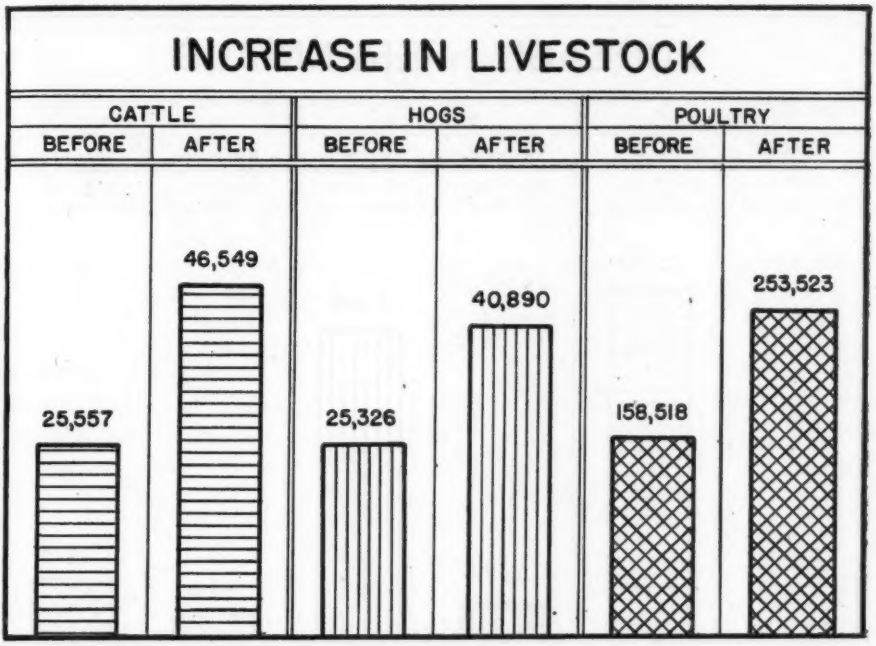
Farmers, too, have responded to the call for increased production. Many are growing new crops to replace import losses caused by enemy action or lack of shipping facilities. The hemp acreage, for example, has been expanded considerably in Kentucky and several Midwestern States. Japanese successes in the Far East also make it necessary to grow more peanuts and soybeans for vegetable oil.

This shift to essential war crops will, however, require far more intensive use of land resources in the Southeast. Many acres of idle or abandoned land in the Southeast—some 8 million acres according to 1940 census reports—may have to be brought back into safe and useful production if we are to meet the food needs of our country and our allies.

Obviously, we cannot afford to follow exhaustive farming practices that endanger the productive capacity of the soil. To have the farm plants break

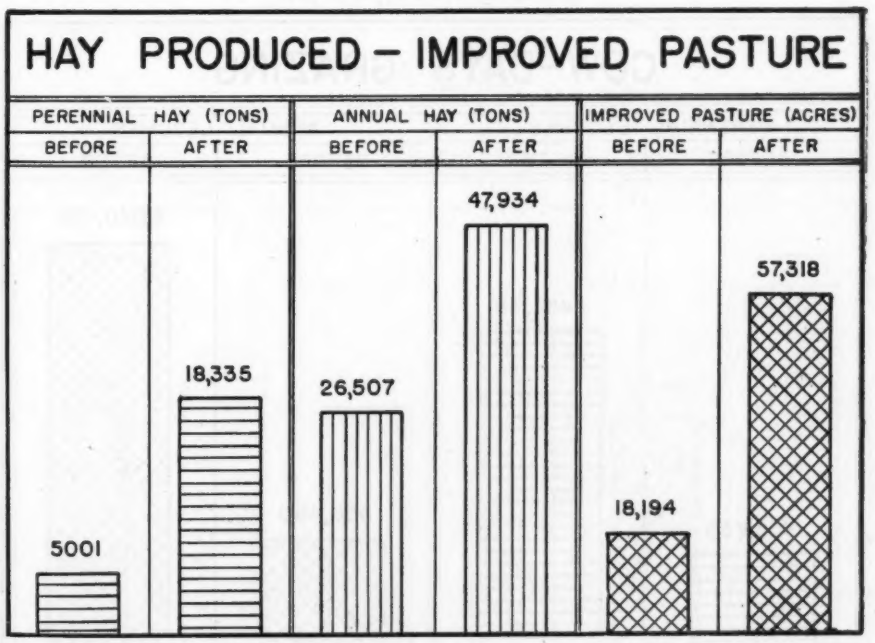

SOIL CONSERVATION DISTRICTS IN THE SOUTHEAST
AREA IN SOIL CONSERVATION DISTRICTS
NUMBER OF DISTRICTS.....156
ACRES IN DISTRICTS....140,151,000
(JANUARY 5, 1943)

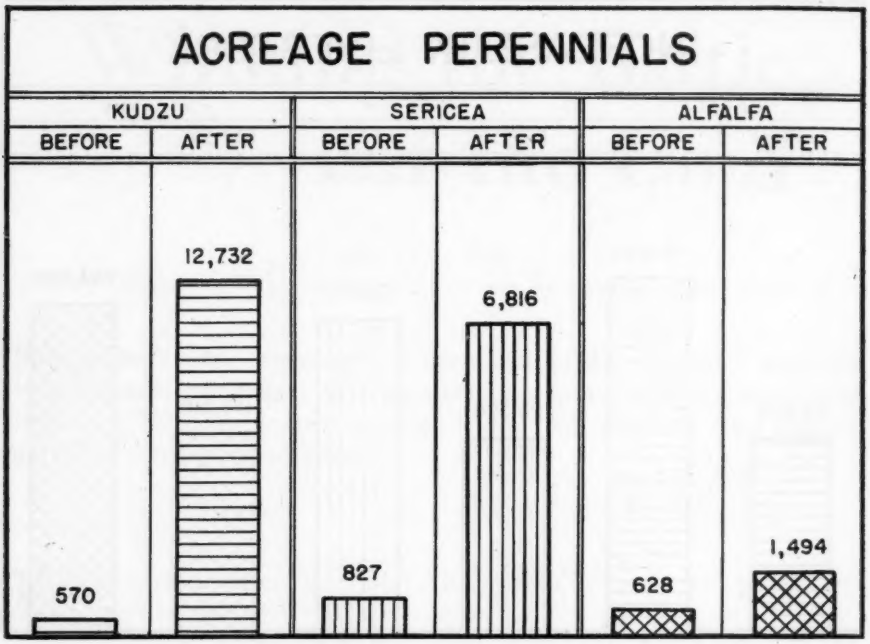
Every state in the Southeast has a soil conservation districts law or enabling act that gives farmers the legal mechanism for organizing and operating districts. More districts are being formed in Kentucky and Tennessee, which were among the last states in the Southeast to pass district laws and consequently as shown by the map do not as yet have as many districts as some of the other states. Practically half the land area in the Southeast is in districts.



Above: By producing more feed as called for in their conservation plans, the farmers cooperating with soil conservation districts were able to raise larger numbers of cattle, hogs, and poultry.

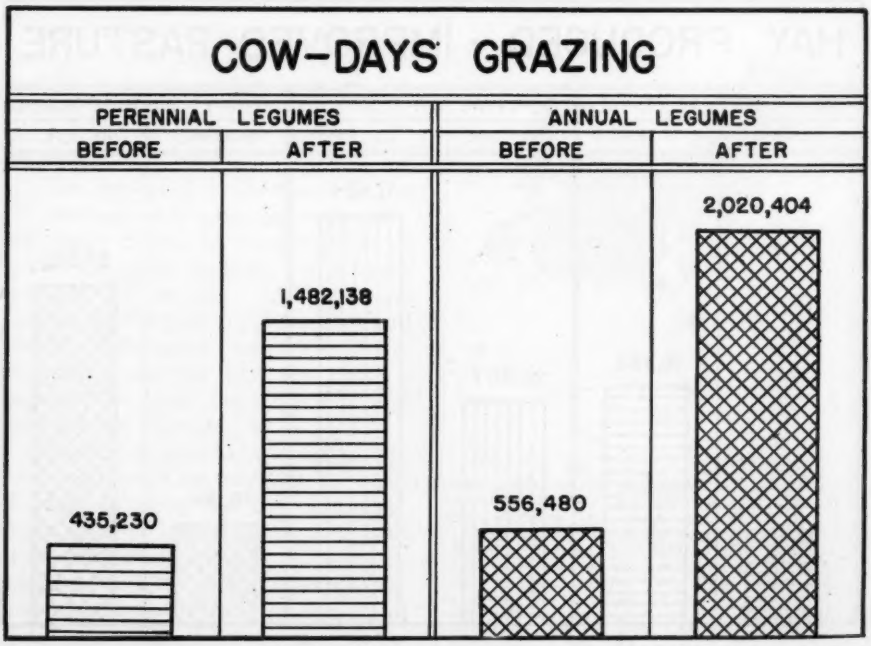
Below: Production of perennial hay increased 267 per cent; annual hay, 81 per cent; and improved pasture, 215 per cent on the 1,829 farms in Southeastern soil conservation districts covered in the survey.

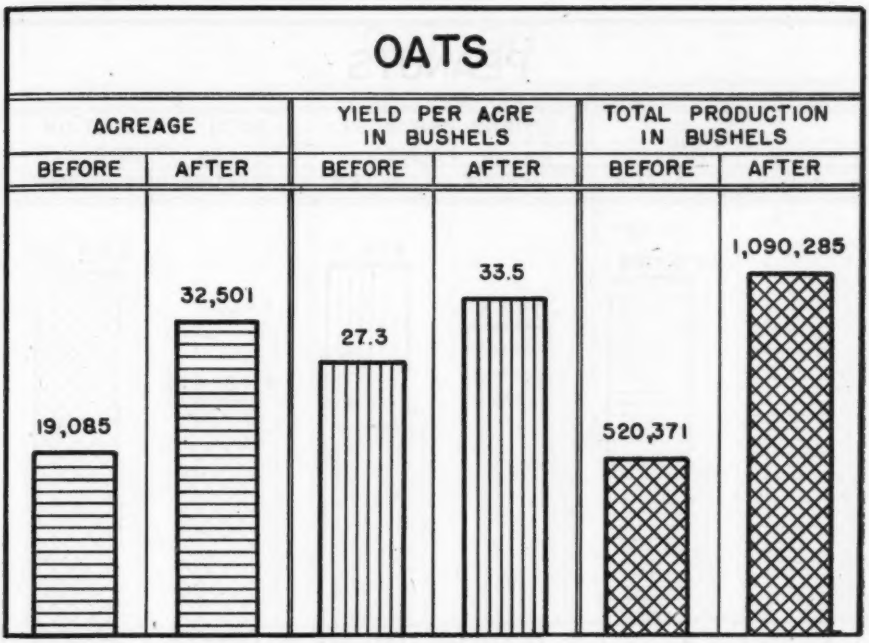




Above: Substantial increases in the acreage of kudzu, sericea, and alfalfa, affording more hay and pasture for livestock, resulted on the 1,829 Southeastern farms following the adoption of conservation plans.

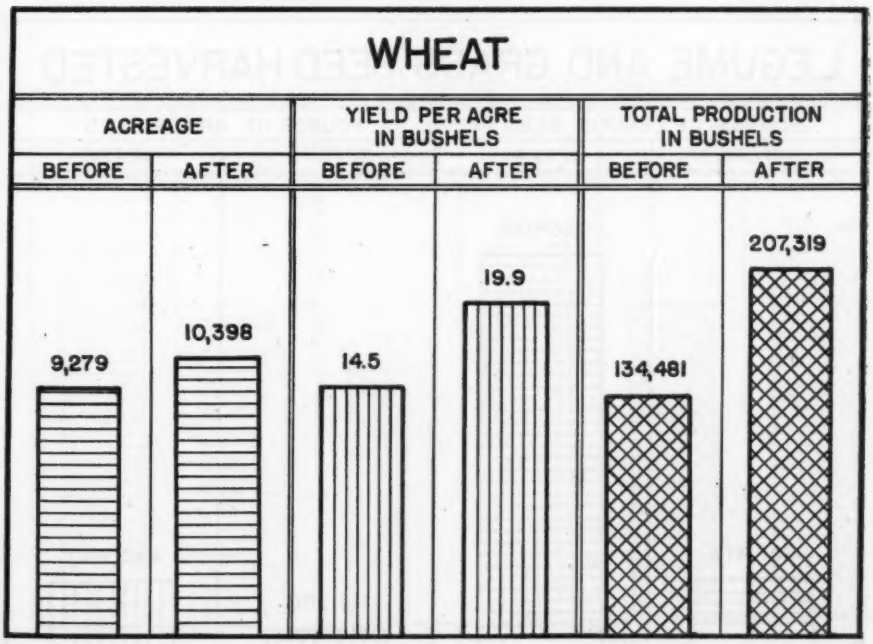
Below: Farmers interviewed in the survey reported 2,510,832 more cow-days grazing annually from both perennial and annual legumes after conservation farming. Both kinds of legumes help keep up milk and beef production.

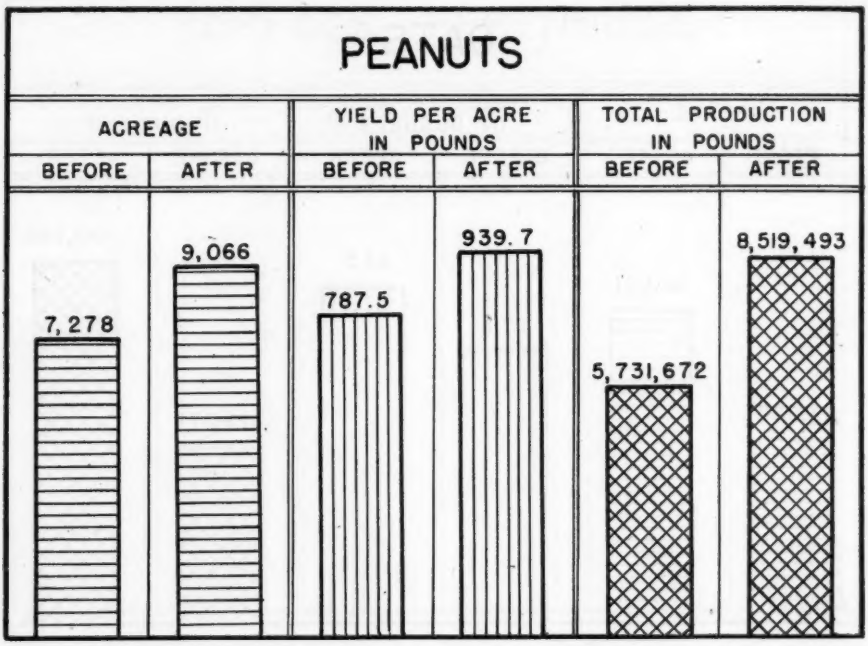




Above: Farmers cooperating with soil conservation districts, covered in the survey, greatly expanded their acreage of oats, and through conservation measures raised their yields from 27.3 to 33.5 bushels an acre.

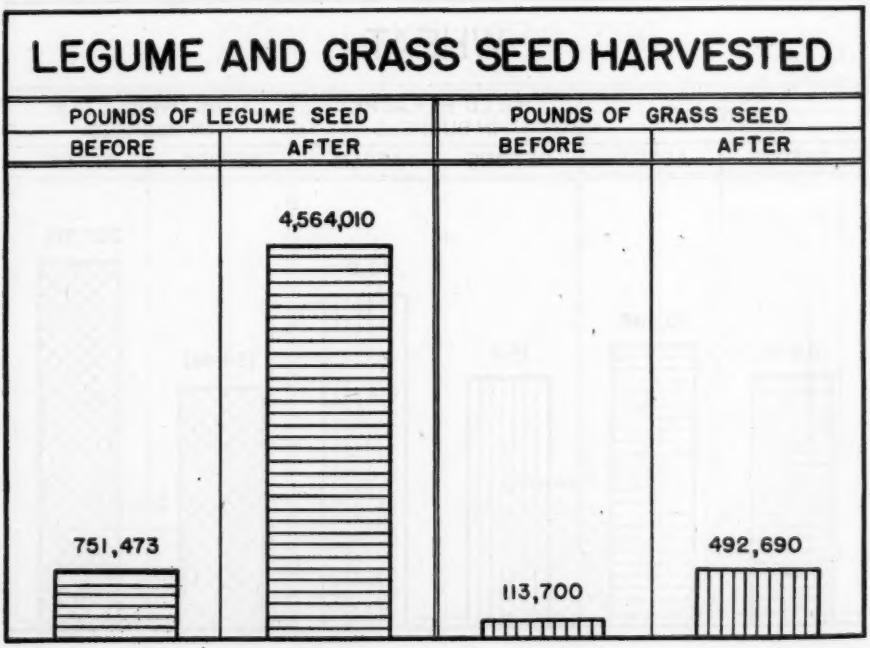
Below: Cooperators of soil conservation districts now grow more wheat than formerly for feeding livestock and for family use. The survey showed a substantial increase in acreage and an increase in yield from 14.5 to 19.9 bushels an acre.

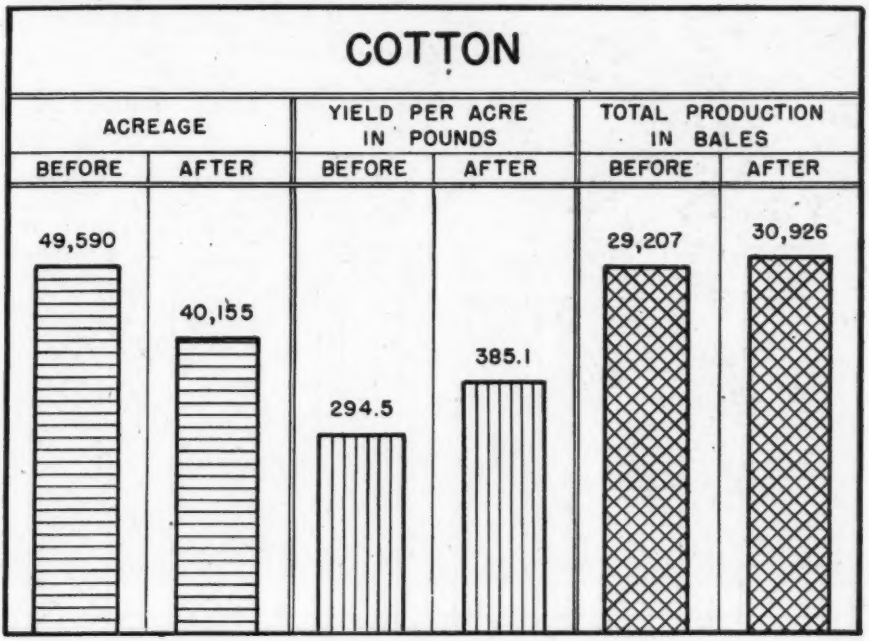




Above: In the peanut-growing sections of the Southeast, cooperators of soil conservation districts not only increased their peanut acreage to meet war demands, but raised their acre yields, resulting in greater total production.

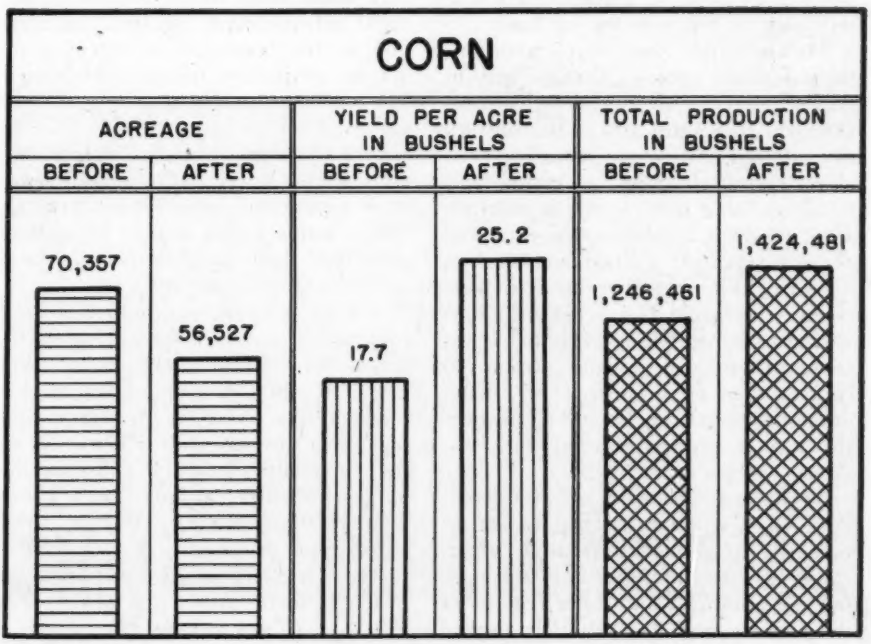
Below: More land in soil-conserving crops results when farmers grow their own legume and grass seed. The chart shows the substantial increase in seed harvested on the 1,829 farms following complete systems of conservation farming.

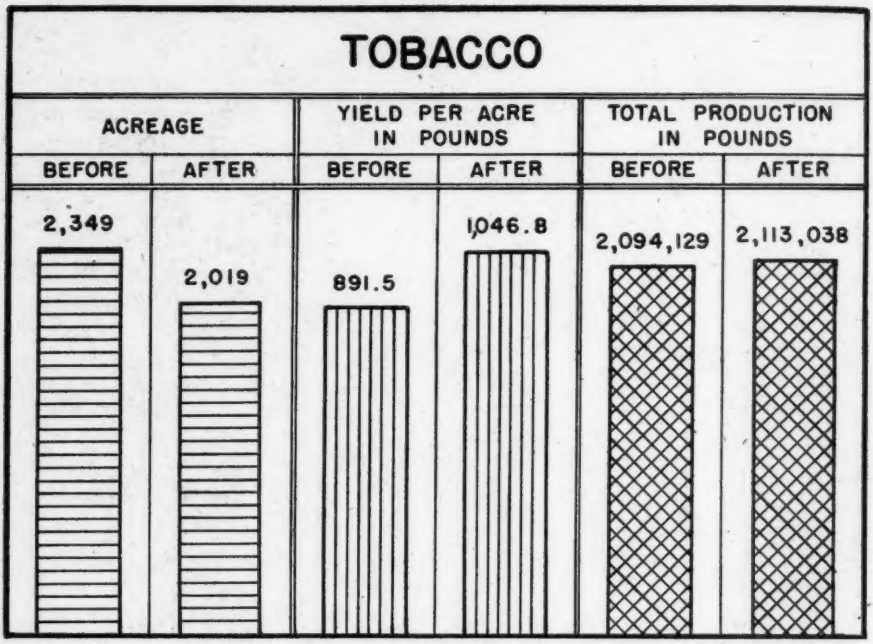




Above: Selective land use and improved crop rotations including legumes enabled the farmers interviewed in the survey to raise their acre yield and total production, although they planted 19 per cent fewer acres.

Below: Farmers canvassed in the survey reduced their corn acreage considerably, but by building up the productivity of their soil were able to raise more corn on fewer acres. The yield rose from 17.7 to 25.2 bushels an acre.





Tobacco growers employing conservation methods raised more tobacco even though the acreage was smaller. Improved row arrangement and cover crops accounted largely for the better yields.

down in the middle of the war would be a major catastrophe, and even after the war, a hungry, battle-worn world will look to this country for food.

The demands that war conditions have imposed upon agriculture may in reality prove highly beneficial to most farms in the Southeast. The substitution of feed and forage crops for such clean cultivated crops as cotton and tobacco so that more livestock and livestock products can be produced to supply war needs is a good conservation measure. On the other hand, market peanuts are a notable exception. This war crop is badly needed, but it is extremely "hard" on the land. Improved conservation methods that are being developed promise, however, to help the farmer grow this crop with less damage to the land.

Now that increased farm production is a No. 1 war job, it is gratifying to note that conservation farming in recent years has spread rapidly throughout the Southeast and other regions of the country, and has definitely proven itself a wartime production tool as well as a means of saving the soil.

A major share of the success in this rapid advancement of soil conservation in the Southeast in recent years may be credited to the farmer-operated soil conservation districts. As of January 1, 1943, there were 56,746 Southeastern farmers actively cooperating with the districts by following complete systems of conservation farming. Their farms cover nearly 10 million acres, and daily more farmers are joining this conservation army.

A soil conservation district is a local cooperative in which farmers work together in solving their conservation problems. State enabling laws provide the legal machinery for organizing and operating districts, and every state in the Southeast—Kentucky, Tennessee, Virginia, North Carolina, South Carolina, Florida, Georgia, Alabama, and Mississippi—has such a law.

At the head of each district is a board of five resident farmer-supervisors, who

(*Turn to page* 39)

Above: Strip cropping enables farmers to obtain better yields and at the same time protect their land against erosion. These strips of harvested barley were being plowed for planting to a mixture of alfalfa and timothy.

Below: Contour cultivation here is supported by strip cropping—alternate bands of corn and small grain all planted on the contour. In this field the combination of two erosion-control measures was necessary to protect the soil effectively.

Above: Crimson clover, widely used in the Southeast as a winter cover crop, is being plowed under here on a South Carolina farm in the spring to build up the soil. A chain lapping over the moldboard helps plow the clover under properly.

Below: Plowing under a field of crotalaria in North Carolina which is to be planted to corn the following spring. The corn will be followed by small grain in the fall and lespedeza the following spring.

Above: This Georgia farmer finds sericea that he grows in strips on a steep hillside excellent feed for his livestock. He is using a hand scythe to cut the sericea for hay, although machinery usually can be used on such strips.

Below: A good growth of cotton planted on the contour in the Piedmont section of South Carolina, where farmers for years have out of necessity farmed on the contour. They are encouraged to grow cotton in improved rotations, including legumes, to insure a productive soil.

Above: By growing larger feed supplies, cooperators of soil conservation districts have been able to enlarge their poultry flocks. Here Charles Hutchings, Rockmart, Ga., and a neighbor playmate pay a visit to the poultry yard.

Below: More meat for American forces and our Allies is being produced by Southeastern farmers. Farms covered in the survey had 15,000 more hogs after conservation farming than before.

The Editors Talk

Cropper Farming

Share-cropping, a form of tenancy very common in but not restricted to the South, has long been the subject of much discussion from the economic, sociologic, and agricultural viewpoints. It therefore is interesting and valuable to have accurate data on the subject, such as have been collected and analyzed by G. W. Forster.

Dr. Forster is Professor and Head of the Department of Economics at the North Carolina State College of Agriculture and collected his data over a period of 10 years, beginning in 1928 and ending in 1937. The North Carolina Agricultural Experiment Station recently published his findings as its Technical Bulletin No. 73 entitled "Cropper Farming in the Coastal Plain."

The author shows that the share-cropping system was a natural outgrowth of conditions prevailing following the Civil War. He has studied the utilization of land by the share-cropper as well as the owner, the fertilizer used, farming systems followed, income obtained, and the factors affecting them. Based on these studies, the defects of the cropper-farming system and suggested remedies are given.

One of the principal points of discussion in connection with share-cropping has always been whether or not the share-cropper will utilize the land as efficiently as would the owner and whether he will carry on farming practices designed to conserve or build up the soil. Dr. Forster's data indicate that there are some grounds for criticising the share-crop system on these points.

Share-croppers tend to grow cash crops which are soil-depleting and frequently make conditions favorable for erosion, whereas the owner will devote more of his land to hay crops, soil-improving crops, vegetables, and forage for livestock. The share-cropper uses more of the fertilizer of a higher grade on the more important cash crops. In general, about a quarter of the acreage was fertilized with low-grade analyses. This is far too great an acreage being treated with uneconomical fertilizers, yet possibly many felt that this percentage would have been much greater than this survey indicates.

Many Units Are Too Small

In the analysis of the defects of the share-cropping system of tenancy, Dr. Forster believes that in many cases the units farmed are too small to be used advantageously, almost requiring that the share-cropper devote most of the acreage to cash crops rather than try to grow more livestock. The small size also prevents the most efficient layout of the farm. In suggesting remedies for the present defects in the system, a restricting factor is that the operator is interested only in short-time returns.

Under the suggested improvements, it is proposed that more forage crops be grown and livestock in greater numbers be introduced. The author shows how this can be done and still provide a slightly higher income to the share-cropper, and the soil would be maintained in much better condition. If the cropper

should stay on the farm, of course, the improved soil fertility would be reflected in greater returns in the future.

Dr. Forster brings out many other very interesting and significant phases of share-cropping. His study merits the attention of both landowner and tenant, as well as others interested in the stability and improvement of American agriculture.

Lespedeza Appraised

Common lespedeza, a native legume of eastern Asia, was introduced into this country from Japan in the early part of the last century. First identified at Monticello, Georgia, in August 1846, its true value was not recognized until many years later. From this area it spread as a wild plant over millions of acres of pasture land throughout the South. With the improvement of common lespedeza by plant selection, first started by the Tennessee Agricultural Experiment Station, and with subsequent introduction of the annual varieties, Kobe and Korean and the perennial, Lespedeza sericea, the lespedezas came into general use. Recognition of their value for hay, pasture, and soil conservation and improvement has made the crop one of major importance in the eastern half of the United States.

The natural range for lespedeza is roughly from the Great Plains to the Atlantic Seaboard and south of a line running from southern Iowa eastward through southern Pennsylvania and New Jersey. It will grow on almost any type of soil and does well on soils too sour and too low in fertility for clover or alfalfa. Not unlike other farm crops, however, it makes its best growth on the more fertile soils. An average yield of hay for annual lespedeza is about one ton per acre. On fertile soils two to three tons are not uncommon. Sericea yields, under favorable moisture and fertility conditions, frequently reach as much as four tons per acre.

Feeding trials indicate that annual lespedeza hay is nearly equal to alfalfa. Its protein content, if the crop is cut just before the first bloom, varies from 10 to 15%, depending upon the fertility of the soil on which it is grown. Lespedeza provides excellent pasturage during summer and fall when the grasses are usually more or less dormant. Not only does it afford good cover for prevention of soil erosion, but by adding nitrogen and organic matter makes a substantial contribution to soil productivity.

Has Great Potentialities

The role of lespedeza in American agriculture, and particularly in the agriculture of the South, has been a most important one. The significance of this contribution, however, can only be appreciated when weighed against the potentialities under optimum conditions of fertility. Elsewhere in this issue Dr. A. L. Grizzard of the Virginia Agricultural Experiment Station discusses broadly the fertility requirements of lespedeza in an article entitled "Lespedeza Is Not A Poor Land Crop". We are sure that after receiving this information, many growers will want to revamp their fertility practices in an effort to get maximum production from their lespedeza acreage. Whether this gift from the land of the Rising Sun turns out to be a blessing to American agriculture, or to use the words of a distinguished American agronomist, be accepted as just another "milestone in a decadent agriculture," is up to the dissemination of the new findings in cultural practices.

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	13.6	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	15.1	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	19.1	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	28.3	110.0	108.3	79.5	101.8	10.05	44.42	....
February	17.80	15.0	104.5	98.6	76.6	104.9	10.76	45.04	....
March	18.06	13.4	103.9	100.2	78.4	105.1	11.03	44.18	....
April	19.03	12.7	116.2	102.4	79.7	99.7	11.13	43.90	....
May	19.17	21.3	114.8	105.6	81.4	99.8	10.82	43.99	....
June	18.26	30.2	111.1	108.6	81.9	95.7	10.00	43.87	....
July	18.55	31.0	125.8	112.2	83.1	94.6	9.05	43.20	....
August	18.03	33.5	115.4	137.3	83.4	95.4	8.89	44.04	....
September	18.59	35.1	107.7	120.5	82.6	102.6	9.03	45.33	....
October	18.87	42.3	102.5	107.9	77.5	103.5	9.39	46.46	....
November	19.22	39.8	108.4	103.5	75.9	104.4	9.84	45.01	....
December	19.55	40.0	111.8	110.3	80.2	110.3	10.46	44.72	....
1943									
January	19.74	35.1	117.8	121.4	88.0	117.5	11.20	44.34	....
February	19.68	18.2	125.7	129.8	90.4	119.5	11.94	44.88	....

Index Numbers (1910-14 = 100)

1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	150
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	175	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	104
1935	94	155	71	84	119	98	89	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	131	98	86	73	72	58	103	109
1940	78	145	102	97	91	84	64	126	121
1941	107	184	93	108	99	95	68	162	145
1942	149	272	158	124	123	116	84	206	199
February	144	144	150	113	118	119	90	209	161
March	146	129	149	114	121	119	92	205	136
April	153	122	167	117	123	113	93	203	158
May	155	205	165	121	126	113	91	204	152
June	147	290	160	124	126	109	84	203	169
July	150	298	181	128	128	108	76	200	200
August	145	322	166	157	129	108	74	204	256
September	150	338	155	138	127	117	76	210	191
October	152	407	147	123	120	118	79	215	226
November	155	383	156	118	117	119	82	208	238
December	158	385	161	126	124	125	88	207	293
1943									
January	159	338	169	139	136	134	94	205	277
February	159	175	181	148	140	136	100	208	301

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11-12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated, 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16-17% ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.71	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.30
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
February	1.73	1.41	6.98	5.77	3.34	5.23	6.62
March	1.75	1.41	6.48	5.77	3.34	5.46	6.93
April	1.75	1.41	6.48	5.77	3.34	5.46	6.80
May	1.75	1.41	6.29	5.77	3.34	5.46	6.97
June	1.75	1.41	5.23	5.77	3.34	4.98	6.94
July	1.75	1.41	5.99	5.77	3.34	4.86	6.80
August	1.75	1.42	5.77	5.77	3.34	4.86	6.94
September	1.75	1.42	5.69	5.77	3.34	4.86	6.97
October	1.75	1.42	5.72	5.77	3.34	4.86	6.80
November	1.75	1.42	6.06	5.77	3.34	4.86	6.53
December	1.75	1.42	5.68	5.77	3.34	4.86	6.53
1943							
January	1.75	1.42	5.68	5.77	3.34	4.86	6.53
February	1.75	1.42	5.83	5.77	3.34	4.86	6.53

Index Numbers (1910-14 = 100)

1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	136	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	112	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	121
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
February	65	49	199	163	110	155	188
March	65	49	185	163	110	162	197
April	65	49	185	163	110	162	193
May	65	49	180	163	110	162	198
June	65	49	149	163	110	148	197
July	65	49	171	163	110	144	193
August	65	50	165	163	110	144	197
September	65	50	163	163	110	144	198
October	65	50	163	163	110	144	193
November	65	50	173	163	110	144	186
December	65	50	162	163	110	144	186
1943							
January	65	50	162	163	110	144	186
February	65	50	167	163	110	144	186

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports‡	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports‡
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.535	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	25.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.607
1940	.516	1.90	5.50	.517	.730	....	.573	....
1941	.547	1.94	5.64	.522	.748	25.55	.570	....
1942	.600	2.13	6.29	.522	.748	25.74	.205	....
February	.600	2.00	6.00	.535	.755	26.00	.210	....
March	.600	2.20	6.50	.535	.755	26.00	.210	....
April	.600	2.20	6.50	.535	.755	26.00	.210	....
May	.600	2.20	6.50	.535	.755	26.00	.210	....
June	.600	2.20	6.50	.471	.665	22.88	.185	....
July	.600	2.20	6.50	.503	.755	26.00	.197	....
August	.600	2.20	6.50	.503	.755	26.00	.197	....
September	.600	2.20	6.50	.503	.755	26.00	.197	....
October	.600	2.10	6.20	.535	.755	26.00	.210	....
November	.600	2.00	5.90	.535	.755	26.00	.210	....
December	.600	2.00	5.90	.535	.755	26.00	.210	....
1943								
January	.600	2.00	5.90	.535	.755	26.00	.210	....
February	.600	2.00	5.90	.535	.755	26.00	.210	....

Index Numbers (1910-14 = 100)

1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	116	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	....	87	....
1941	102	54	116	73	78	106	87	....
1942	112	59	129	73	78	106	84	....
February	112	55	123	75	79	108	85	....
March	112	61	133	75	79	108	85	....
April	112	61	133	75	79	108	85	....
May	112	61	133	75	79	108	85	....
June	112	61	133	66	70	95	81	....
July	112	61	133	70	79	108	83	....
August	112	61	133	70	79	108	83	....
September	112	61	133	70	79	108	83	....
October	112	58	127	75	79	108	85	....
November	112	55	121	75	79	108	85	....
December	112	55	121	75	79	108	85	....
1943								
January	112	55	121	75	79	108	85	....
February	112	55	121	75	79	108	85	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	142	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	157	151	112	100	131	109	80
1926.....	145	155	146	119	94	135	112	86
1927.....	139	153	139	116	89	150	100	94
1928.....	149	155	141	121	87	177	108	97
1929.....	146	153	139	114	79	146	114	97
1930.....	126	145	126	105	72	131	101	99
1931.....	87	124	107	83	62	83	90	99
1932.....	65	107	95	71	46	48	85	99
1933.....	70	109	96	70	45	71	81	95
1934.....	90	123	109	72	47	90	91	72
1935.....	108	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	121	130	126	81	50	129	95	75
1938.....	95	122	115	78	52	101	92	77
1939.....	93	121	112	79	51	119	89	77
1940.....	98	122	115	80	52	114	96	77
1941.....	122	130	127	86	56	130	102	76
1942.....	157	152	144	92	57	161	112	76
February..	145	147	141	94	57	173	112	78
March....	146	150	142	94	57	171	112	78
April.....	150	151	144	94	57	171	112	78
May.....	152	152	144	94	57	169	112	78
June.....	151	152	144	90	57	151	112	69
July.....	154	152	144	91	57	157	112	74
August....	163	153	145	91	57	155	112	74
September.	163	154	145	91	57	154	112	74
October...	169	155	145	92	57	154	112	78
November.	169	156	146	92	57	158	112	78
December..	178	158	147	92	57	154	112	78
1943								
January...	182	160	149	92	57	154	112	78
February..	178	162	149	92	57	155	112	78

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ The fertilizer report issued in Indiana is one of the most complete and informative of any issued in the country. The report for 1941 entitled "Inspection of Commercial Fertilizers," and issued as Purdue University Agricultural Experiment Station Circular 275, by H. R. Kraybill, D. M. Doty, and associates, continues to give the data as in the past. The leading analysis sold in the state was 2-12-6, with more than triple the tonnage of its nearest competitor. Other leading analyses in the order of their importance were 0-12-12, 0-20-0, 0-14-6, 0-8-24, 3-12-12, 0-20-20, 2-12-12, rock phosphate, 2-8-16, and sulphate of ammonia. The more than 100 other analyses sold less than 5,000 tons each. The average total concentration of plant food in the fertilizer was slightly lower in 1941 than in the last several years, although there were still a little over 25 units of plant food per ton of fertilizer sold in the State. The average concentration increased rather regularly from 1920 to 1936, but since that date there has not been much change. The ratio of nutrients reported was 1 part of nitrogen to 6.8 parts of phosphoric acid, to 4.7 parts of potash, approximately the same as in the previous year.

"Commercial Fertilizer Sales as Reported to Date for the Quarter Ended December 31, 1943," Dept. of Agr., Sacramento, California.

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Winning the Battle for the Land

(*From page* 26)

may call upon federal, state, and local agencies and organizations for aid. The policy of the Soil Conservation Service is to help these districts to the fullest extent possible. Upon request, the Service assigns technicians to work with farmers of the districts in developing farm conservation plans.

Other agencies and organizations also help the districts. The State Extension Services assist in educational activities. Teachers of vocational agriculture likewise help speed up the conservation work. Aid from the Agricultural Adjustment Agency, the Farm Credit Administration, and the Farm

Security Administration also further improve agricultural conditions in the districts.

The spread of soil conservation districts in the Southeast since early in 1937, when the President suggested the passage of state district laws, or enabling acts, has been surprisingly rapid. There are now 164 districts, embracing 140,151,000 acres. They cover about half the land area in the Southeast, and continually more districts are being organized.

More gratifying, these districts are changing the agricultural pattern in the Southeast through their conservation programs, and are thereby helping in wartime to shorten the road to victory. Just how effectively the work of these farmer-operated districts figures in wartime farm production is revealed by a recent survey the Soil Conservation Service made of 1,829 widely scattered Southeastern farms. The farms belong to district cooperators and furnish a typical picture of the 56,746 farms following complete systems of conservation farming.

Before and After

Crop production before conservation farming as shown by the survey was based on an average of annual yields covering 2 or 3 years preceding the development of conservation plans. Likewise, the average of 2 or 3 years was used in determining crop production after conservation farming. Similar periods were used in reporting on livestock and poultry.

Among the farmers interviewed, the number having dairy herds and beef cattle increased from 1,728 to 1,800, and the number of cattle as shown by Chart I increased from 25,557 to 46,549, or 82 per cent. The number of hogs mounted from 25,326 to 40,890, or an increase of 62 per cent. Chickens increased from 158,518 to 253,523, or 60 per cent. In short, the farmers had 20,000 more cattle, 15,000 more hogs, and 95,000 more chickens after conservation farming than they had before.

Obviously, this increase in livestock and poultry did not occur overnight. It accompanied, or followed closely, the pasture improvement work and establishment of hay and other feed sources as provided for in the detailed conservation plans for the farms. Likewise, the acreage of perennial and annual hay crops was greatly expanded. As these new sources of forage came into production, the farmers began to increase their livestock.

Pasture Improvement

More pasture and hayland were made possible in most cases by reducing the corn and cotton acreage and bringing idle or badly eroded land into productive use. Through selective land use and improved crop rotations in which soil-building legumes such as lespedeza, crotalaria, blue lupine, vetch, and clovers were used, the yields of cotton and corn were improved. Owners of the farms covered in the survey also reported that terraces, terrace outlets, and grassed waterways had more than paid for themselves within a short time through less soil loss, holding moisture in the ground, and in preventing valuable plant food from leaching out and washing away.

From Chart II it is apparent that the farmers were much better prepared to contribute to the war effort than they were before they began conservation farming. Only 175 farmers of the 1,829 harvested perennial hay before conservation plans were made. Their total annual production amounted to only 5,001 tons. Since then more of these farmers have begun growing perennial hay, and the annual production has increased to 18,335 tons on 996 farms, or an increase of 267 per cent.

Similarly, the production of annual hay has increased from 26,507 to 47,934 tons, or 81 per cent. Most of the perennial hay was grown on eroded or idle land that was not growing any crop before conservation plans were developed, and did not replace annual hay.

Emphasis that soil conservation dis-

tricts are placing on pasturage was reflected in the survey by an increase of 215 per cent in the acreage of improved pasture. Before conservation farming, there were 18,194 acres of improved pasture on 503 farms; and after conservation farming, 57,318 acres on 1,604 farms.

Among the 1,829 farmers only 85 were growing kudzu (Chart III) before they began conservation farming. The land in kudzu totaled 570 acres, but now 1,314 farmers have a total of 12,732 acres in kudzu. The acreage of sericea lespedeza likewise has increased from 827 acres on 76 farms to 6,816 acres on 1,022 farms, and alfalfa from 628 acres on 92 farms to 1,494 acres on 170 farms.

Increased Cow-days Grazing

The increase in cow-days grazing (Chart IV) from perennial legumes was 241 per cent and from annual legumes, 263 per cent. From both perennial and annual legumes the farmers canvassed in the survey averaged 991,710 cow-days grazing annually before they began conservation farming. After establishing these legumes or adding to existing acreage as called for in their conservation plans, they reported 3,502,542 cow-days grazing annually, or 2,510,832 more days, an increase of 253 per cent.

In connection with Chart I showing substantial increases in livestock and charts showing greater forage and feed, it may be noted that the number of livestock did not increase as fast or at the same rate as feed production. Generally, most farms in the Southeast are deficient in forage and feed supplies; in fact, too often maximum returns are not obtained from livestock because of inadequate feed supplies. The farmers interviewed in the survey were producing sufficient feed and were planning to increase still further the number of animals on their farms.

The oats acreage on farms covered in the survey (Chart V) increased from 19,085 to 32,501 acres, and the yield per acre from 27.3 to 33.5 bushels. The 1,276 farmers growing oats after conservation farming produced 1,090,285 bushels, or an average of 33.5 bushels an acre. Before conservation plans were developed, 980 farmers reported growing oats and their total annual production amounted to only 520,371 bushels, or 27.3 bushels an acre.

Although wheat is not an important commercial crop in the Southeast, more farmers are planting this crop as a conservation measure and for producing feed for poultry and food for family use. The wheat acreage on the farms canvassed in the survey (Chart VI) was expanded from 9,279 acres on 824 farms to 10,398 acres on 1,060 farms. The annual yield per acre as a result of conservation farming rose from 14.5 to 19.9 bushels, and total annual production from 134,481 to 207,319 bushels.

Cooperators of soil conservation districts in the peanut-growing sections in the Southeast (Chart VII) not only have increased their peanut acreage to meet war demands, but have boosted their acre yields, resulting in greater total production of this essential war crop.

Increased Acreages

The yield per acre on the farms covered in the survey increased from 787.5 to 939.7 pounds, or 19.3 per cent. Acreage was increased from 7,278 to 9,066 acres, and total production from 5,731,672 to 8,519,493 pounds—an increase of 48.6 per cent. Soil conservation districts help peanut growers select land suitable for growing peanuts and in adopting measures that keep the land productive and protected against erosion.

Another benefit of conservation farming as shown by Chart VIII is the increased production of legume and grass seed on farms of district cooperators. The seed consisted principally of annual lespedeza, lespedeza sericea, white Dutch clover, crotalaria, blue lupine, and similar crops. The grass seed was largely Dallis.

Of the 1,829 farmers interviewed, only 322 were producing legume seed before they began conservation farming. Their annual production was 751,473 pounds. Since then the annual production has increased to 4,564,010 pounds on 1,091 farms. The quantity of grass seed harvested likewise has increased fourfold.

Although more land on the 1,829 farms was put into hay, pasture, and grain crops so more forage and feed might be available for livestock, the farmers produced some 1,700 more bales of cotton annually on 9,400 less acres. Increased soil fertility brought about by soil conserving practices and using land best suited to the crop accounted largely for the better yields.

The cotton acreage (Chart IX) was reduced from 49,590 acres on 1,429 farms to 40,155 acres on 1,401 farms, or 19 per cent fewer acres. The yield of lint cotton per acre, however, increased from 294.5 to 385.1 pounds, or 30.8 per cent, which has resulted in producing 30,926 bales on the smaller acreage, as compared with 29,207 bales on the larger acreage.

Likewise, the farms covered in the survey were able to reduce their corn acreage, yet produce more than formerly. As shown by Chart X, the corn acreage was cut down from 70,357 acres on 1,762 farms to 56,527 acres on 1,754 farms, or a reduction of 19.7 per cent. Total production, however, increased from 1,246,461 to 1,424,481 bushels, or 178,020 more bushels.

Tobacco growers who were interviewed reported that an improved row arrangement, for handling run-off after rains, and cover crops of grass or small grain had helped boost yields from 891.5 to 1,046.8 pounds an acre. As shown by Chart XI, the total annual production on 279 farms climbed from 2,094,129 to 2,113,038 pounds, although the acreage had been reduced from 2,349 to 2,019 acres.

The progress that the 1,829 farmers interviewed in the survey have made in using their land more efficiently and in diversifying their farming activities demonstrates that agriculture in the Southeast can be vastly improved through conservation farming. Moreover, it reveals the effective influence that local soil conservation districts, under alert leadership, can exert.

Influence Widens

In traveling through the Southeast it becomes quite apparent that many other farmers, both within and outside of soil conservation districts, have become acquainted with conservation measures being employed by district cooperators and have adopted a number of these measures on their farms. From this it can be seen that the sphere of influence of a soil conservation district is by no means limited to its cooperators or even by its boundary lines. The years to come will, no doubt, see the districts accomplishing even more in the rebuilding of agriculture in the Southeast, as each year shows continued increases in the number of farmers adopting complete systems of conservation farming.

Boron and Potash for Alfalfa in the Northeast

(*From page* 15)

well.) The normal precipitation of June had given way to a period of very light rainfall. On July 11, County Agent Cary and the writer put borax at the rate of about 30 lbs. an acre on a plot of Wallace's alfalfa. Up to that date, potash deficiency had not been noted. It showed up later, however, and potash was applied on July 17 at the rate of 400 lbs. of 50 per cent muriate to the acre. During the remainder of July, rainfall continued far

below normal. Symptoms of severe boron deficiency became common on this type of soil throughout the county. Potash deficiency also occurred commonly, not only on the Madrid soils but on other sandy ones as well.

Ten tests in all were established by the writer; all but one of them involved the application of both boron and potash. Borax was put on at the rate of 40 lbs. an acre on a strip 2 rods wide and 4 rods long, and 400 lbs. of muriate of potash to the acre were applied to a strip of the same size. The two strips overlapped one-half. The tests, therefore, consist of a strip of alfalfa treated with borax alone, one with both borax and potash, and another with potash alone. All fields had received reasonably adequate amounts of phosphorus for good growth of alfalfa.

Results From Treatments

The potash-deficiency symptoms disappeared generally only a few days after sufficient rainfall to dissolve and carry the potash into the soil. It appears that sufficient rain fell on the Wallace farm soon after July 11 to carry the boron to the roots of the alfalfa, because, only two weeks later, the boron-treated alfalfa was taller and greener than the untreated. In the meantime, distinct boron-deficiency symptoms developed on the untreated alfalfa, but no yellow top was seen on that treated with boron. By the end of July, the boron-treated alfalfa had much more bloom and had made considerably taller growth than the untreated alfalfa.

This alfalfa was harvested on August 25, six weeks after borax was put on. Because of the drought, no effect of potash on growth up to that date was to be expected. The yields are illustrated in Fig. 2.

Since potash as yet had had no effect, there are in reality duplicate plots of untreated and of boron-treated alfalfa. On the basis of 15 per cent of moisture in the hay, the average of two no-boron plots was 1,566 lbs. and that of two boron-treated areas, 2,120 lbs. of hay to the acre. Although the yield was not large, boron increased it one-third, or at a rate of more than one-fourth ton of good alfalfa hay to the acre. On the basis of an unharvested, field value of $8.00 a ton, the hay produced by the borax added was worth about twice its cost. In two other tests, there was enough rain for the treatment to become effective. In one, the growth was materially increased by boron. In the other, the boron-treated alfalfa set a heavy crop of seed despite severe drought through July and most of August. The alfalfa with no added boron set almost no seed.

It will be highly desirable to take yields over the next two years on these and about 70 additional tests with boron and potash on alfalfa in northern and eastern New York that were established in 1942 by McAuliffe and Dawson, and also the earlier ones by Colwell.

As is well known, a 10-ton application of average farm manure supplies about 100 lbs. of potash. Alfalfa or clover hay contains about 40 lbs. of potash to the ton. This quantity of manure supplies the potash required for 2½ tons of hay. We must, of course, expect legumes to obtain a considerable part of their requirements from the soil itself. Ten tons of manure, therefore, may be expected to be of real service over a period of two years.

A few observations apply to boron. On one field about 17 tons of manure were applied for alfalfa in the spring of 1942. The first cutting looked like at least 3 tons an acre. The second growth showed distinct symptoms of boron deficiency in parts of the field. Even so, the yield was fairly satisfactory. Normal rates of application of manure produced from crops grown on boron-deficient soils do not solve the boron-deficiency problem.

It is obviously impossible for an experiment station to conduct tests on a number of alfalfa fields sufficient to determine the boron and potash needs for an entire state. It is definitely urged, therefore, that farmers be encouraged to establish tests similar to those de-

scribed on their own fields wherever even mild symptoms of deficiency of either boron or potash have been observed (Fig. 3). A good idea of the effect of this treatment on yields is essential for a decision as to whether borax or potash treatment pays on a particular farm.

On fields known to be deficient in boron and potash, the use of 30 to 40 lbs. of borax and 200 to 400 lbs. of muriate of potash to the acre should prove unusually profitable in this section of the country.

It is important not to lose sight of the fact that drought intensifies symptoms, especially of boron deficiency, and that more than normal rainfall obscures these symptoms. Because excessive liming, particularly on light soils, intensifies the effects of a lack of sufficient available boron, liming should be restricted to the known needs of alfalfa and clover.

More Smokes Per Acre

(*From page* 12)

tilizer attachment. The fertilizer can then be well mixed with the soil by running a narrow single shovel plow through the ridge left by the corn drill and the furrow filled by straddling with a tobacco hiller.

Where more than 500 pounds of fertilizer is used to the acre, it is a good practice to apply half or more of it broadcast through a wheat drill or lime spreader, and place the remainder in the row or in the hill.

Healthy, vigorous plants are the first requisite of a successful tobacco crop. To be assured of a good start, it is often desirable to use some commercial fertilizer on the plant bed. Roy Milton, tobacco specialist with the Tennessee Extension Service, advises 25 pounds of a high-grade complete fertilizer, such as a 3-9-6 or a 4-8-8, applied broadcast on each 9 x 50 feet of bed and worked well into the soil before seeding. Many farmers use twice this amount and more.

Five pounds of a readily available nitrogen fertilizer may be dissolved in 25 gallons of water and sprinkled over each 100 yards of plant bed in late afternoon to hasten slow-growing plants along. This may well be followed with at least a barrel of clear water to prevent the buring of tender leaves. Best results are obtained by removing canvas before the water is sprinkled over the bed area. Fertilizer can be applied in dry form if plants are dry, but there is a greater danger of burning. Nitrates act quickly and produce tender plants, and so extra time should be allowed for toughening after the canvas is removed.

Tests have been conducted at the Greeneville Station for several years to determine the best cropping systems for growing burley. In 2-year rotations some outstanding differences have begun to appear, particularly where crimson clover and hairy vetch were used. The corn and tobacco sequence produced an average of only 535 pounds of leaf in 1940, and that was of poor quality. Compared with this, the hairy vetch plots produced an average of 1,364 pounds of good-quality leaf and crimson clover plots produced 1,224 pounds of a fair quality. The soybean-tobacco rotation is beginning to give better results in pounds and quality than the cowpea-tobacco rotation. Fallow-weed plots and rye-weed plots are producing good leaf of about equal quality, but neither combination is yielding as well as the vetch or crimson clover plots.

Where tobacco was grown one year

out of three in rotations of both Korean lespedeza and grass, some reduction was evident in yields after two completions of the series. Tobacco grown on the grass plots showed distinct nitrogen deficiency. There was very little difference in red clover, sericea, alfalfa, sweet clover, or clean-fallow plots in the 3-year cropping system series, but a weed rotation gave slightly higher yields and returns than either of these crops.

Black root rot is an ever-increasing difficulty in burley production and few sections are free of it. The use of barnyard manure seems to encourage the development of root rot, even in rotations where tobacco is grown no more often than once in 3 years and no legumes are grown. Tests have been made at Greeneville during recent years to determine resistance of the more common burley varieties to this organism and their ability to yield quality leaf under heavy infestation. At present the following varieties are giving the best results: Kentucky No. 16, Kentucky No. 5, and Tennessee Golden. Neither of these varieties have all that might be desired, but are resistant to black root rot and produce leaf of a fair quality. New strains and varieties are being tested each season at the Station and on neighboring farms.

Studies of cultural practices indicate that burley plants should be set 12-15 inches apart in 3½ feet rows for best results. There is also very convincing evidence against deep cultivations after plants are 18 inches or more high. Profits are being plowed off when feeder roots begin to collect on the beam of the plow, and if it is necessary to kill grass and weeds at this stage, it had best be done with a hand hoe.

For best results, burley should be topped—16 to 22 leaves, depending on the fertility of the soil and vigor of the plants. Suckers should be kept cleaned off, as they rob the leaves of plant food. Tobacco is usually ready to cut when the first set of suckers has been pulled from bottom to top and the second set pulled down to the middle of the stalk.

Tests over a period of 7 years have not indicated any great difference in the quality of leaf obtained by scaffolding in the open a week or 10 days, and putting tobacco in the barn as soon as it is wilted after cutting. Moisture and heat regulation in the barn seem to be what count most in curing.

Indirect Nitrogen Fertilization

(*From page* 19)

found that land on which grass was grown continuously, but mowed and allowed to remain, gained an annual average of 41.5 pounds of nitrogen per acre over a period of 10 years. If we take the figures of Wilson(7), the nitrogen in the rain would amount to about 6 pounds yearly, giving a fixation in that soil by this type of organism of about 35 pounds of nitrogen per acre. In view of these experiments, it seems fair to assume that the amount fixed in this way on an average soil is about 25 pounds per acre per year. Even so, it is generally agreed that a good lime and mineral supply in the soil, as well as a liberal amount of organic matter, is necessary for the proper functioning of this group of organisms.

Even though the transformation of organic nitrogen to the available form, or the fixation of nitrogen in the soils by legume and other organisms, did not enter the picture, it still would be wise to supply the soil well with the minerals. An abundance of nitrogen would

be of little value if lime, phosphorus, or potash were deficient. The maximum effect of nitrogen can be secured only when there is a sufficient amount of the other elements present. If there is a deficiency of phosphorus or any other element, the nitrogen applied will not be efficient until that deficiency is eliminated. It would be better to have a surplus of the minerals rather than have a deficiency of any one of them. It boils down to this: we need now above all times, a generous supply of potash, phosphorus, and lime in the soil in order to get the greatest efficiency of the nitrogen in the growth of any crop.

Application of Fertilizer

In connection with the efficiency of fertilizer or manure much depends on the amount and method of application.

For years the usual way to apply fertilizers was broadcast. During the past 10 years a large amount of experimental work has been done on fertilizer placement, and generally broadcast treatments have not proven the best. Usually some type of placement seems most satisfactory. On some row crops, such as corn, excellent results have been secured by placing the fertilizer in bands at the side of the corn, at or below the seed level. Apparently the fertilizer should not be too near the surface because it will readily dry. This will have a tendency to increase the amount of fixation of the phosphorus and potassium in unavailable forms. Manure plowed under is likely to lose less nitrogen than if it remains on the surface. Recently some research workers have received good results by placing the fertilizer deeply in the soil. This has been accomplished by putting the fertilizer in a band in the bottom of the furrow when plowing, or putting the fertilizer on the surface and plowing it under. Alfalfa and many of the leguminous crops which take nitrogen from the atmosphere are deep-rooted, and it may be possible that deep incorporation of the fertilizer might be of special value in connection with this type of plant.

A farmer is likely to get relatively more benefit from his farm manure by applying it to a number of acres rather than concentrate it on a few acres. In fact, this year farm manure in many cases might well be used as a supplement where there is the greatest shortage of nitrogen. If a person had 300 pounds of nitrate of soda to apply on vegetables, most likely a proportionately greater return would be secured by applying it on two acres rather than all on one acre. Bulletin 439 of the Connecticut Agricultural Experiment Station gives some experiments in which 1,500 pounds of a 6-6-8 fertilizer per acre were compared with the same amount of 3-6-8 fertilizer on vegetables. For such crops as spinach, carrots, onions, potatoes, tomatoes, peppers, and sweet potatoes, the fertilizer with half the nitrogen in most cases yielded not more than 10% lower than the one with the full amount of nitrogen. The soil on which these tests were conducted contained a high amount of phosphorus and potassium and apparently was liberally limed. It would appear, therefore, that when the soil is in good condition and supplied with the minerals, the farmer will get reasonably good yields even when the nitrogen of the fertilizer is reduced.

Results of Chemical Tests

Many areas in the United States are deficient in these mineral elements. So far as Delaware is concerned, in most cases they are needed. Long-time experiments at the Delaware Station have given responses to phosphorus and potash, especially to potash.

A large number of soil samples were collected in 1935 from all parts of this State. Various chemical determinations were made on the samples, and from the information the author prepared maps of the State(1) which show the relative condition of the soils. In short, the results indicated that generally the soils are relatively low in organic matter and total nitrogen, and easily extractable calcium, magnesium, phosphorus, and potassium.

Additional information about the

nutritional level of the soils has been secured from rapid chemical tests on samples of soil sent in by the county agents. For about 10 years the writer has been testing these samples, and the values for most of these tests have been filed since 1936. They amount to about 500 samples a year. Since the results did not vary greatly from year to year, the set of results has been summarized by county, Table 3.

TABLE 3.—SUMMARY BY COUNTIES OF RAPID CHEMICAL TESTS ON DELAWARE SOILS FROM 1936 TO JUNE 30, 1942

Element	Group	County		
		New Castle %	Kent %	Sussex %
pH	5.9 and below	68	71	78
	6.0–6.4	15	14	12
	6.5 and above	17	15	10
Ca	Low	37	69	80
	Medium	27	17	16
	High	36	14	4
Mg	Low	12	29	37
	Medium	61	64	58
	High	27	7	5
NO_2	Low	34	29	42
	Medium	26	27	30
	High	40	44	28
P	Low	72	78	63
	Medium	14	14	25
	High	14	8	12
K	Low	60	81	86
	Medium	14	13	9
	High	26	6	5

The easily extractable potash and phosphorus are relatively low in a large part of the soil samples sent in. The low potash condition seems to be a little more pronounced in the more sandy soils of the two lower counties.

The lime situation revolves largely around the pH value of the soil and the calcium and magnesium content. About three-fourths of the soil samples sent in had a pH value of 5.9 or lower. An appreciable number of the tests for readily available calcium and magnesium were relatively low. Of the tests for calcium and magnesium there is a general tendency to get progressively a higher percentage of low tests going towards the lower end of the State. This is due in part to the fact that the soils progressively become more sandy, and a sandy soil will not hold as much lime at the same pH value as a heavier soil. In any case the collective information indicates that for many crops our soils are generally low in lime.

Plants, which were growing on some of these low-testing soils and which were not doing well, have been tested, using a modification of the Morgan system(3) and an adaptation of the Hester method(2) for extracting plant tissue. Tests of this type are becoming more widely used in the study of nutritional problems. The results of the plant-tissue tests, coupled with those of the soil tests, suggested in several cases a deficiency of available potash. In a few of those cases potash was applied in mid-growing season and seemed to

correct the condition. This was especially true of soybeans. This crop when grown with such a deficiency is not likely to add very much nitrogen to the soil.

A number of things can be done to help meet the nitrogen shortage. Leguminous crops are especially important in this connection because they fix nitrogen, and if incorporated in the soil, add active organic matter. The mineral requirements of legumes are high. Not only are Delaware soils relatively low in minerals, but many other areas of the country are the same. Under those conditions fertility experiments together with the aid of soil and tissue tests indicate that liberal fertilization with lime, phosphorus, and potash is of first importance in any effort to solve the present nitrogen shortage.

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Ohio Farmers Try Plow-Sole Fertilizers

(*From page* 10)

TABLE 3.—FARM 3

Fertilizer Treatment	Corn Yield	
	Strain Hy x O7	Strain WF9 x 40B
Lb. per acre	bu./ acre	bu./ acre
10– 8–8 600 plowed under 3–18–9 175 in drill row	111.8	110.5
None plowed down 3–18–9 175 in drill row	84.7	82.2
Gain due to plowed-down goods:		
bu.	27.1	28.3
%	32%	34%

year. The respective crops were soybeans, sweet corn, oats, and timothy. A dark colored, silty clay loam soil predominated over the area. Though the "plow-down" fertilizer (10-10-10) had been broadcast in March with a lime spreader, plowing was delayed until late April. During this lapse of time the timothy (on the sod block) attained considerable growth.

The entire area was planted to Ohio C88 hybrid. The responses to plow-down treatment appear in table 4.

From this table it will be noted that the highest increase in yield was obtained in the block in which soybeans were the preceding crop.

Three commercial hybrid corn growers conducted trials in Preble County.

TABLE 4.—FARM 4

Fertilizer Treatment Lb. per acre	Corn Yields Bu. per acre			
	Previous crops 1941			
	Soybeans for seed	Sweet Corn	Oats	Timothy
10–10–10 525 plowed under 2–12– 6 100 in hill	68.0	87.9	67.1	67.0
None plowed under 2–12– 6 100 in hill	49.0	78.4	56.7	53.3
Gains due to plowed-down fertilizer	19.0 39%	9.5 12%	10.4 18%	13.7 26%

On Farm 5, the field was a rolling brown silt loam (Russell type) with a clover sod, grazed the preceding year, turned under. On Farm 6, a mixed sod of alfalfa and red clover grown on a dark silt loam was plowed under. On Farm 7, a clover sod on a brown silt loam was plowed under.

The fertilizer used on these three farms consisted of sulphate of ammonia and 0-20-20, mixed to give an 8-10-10 grade equivalent. Five hundred pounds of this mixture per acre were applied with a grain drill and plowed under immediately on each of these farms.

Two strains of commercial hybrid corn—Iowa 939 and Indiana 608C, an early and a mid-season hybrid respectively—were planted in these fields.

The test plots were all harvested on October 12, at which time the corn from the plowed-under fertilizer plots contained ½%, 3½%, and 2¾% less moisture than the corn from the plots not so treated. The least difference in moisture contents was found in the early hybrid.

The calculated yields, in terms of shelled corn at 15½% moisture, appear in table 5.

Plowing under fertilizer for corn in the Corn Belt area of Ohio appears to be a promising procedure.

TABLE 5.—FARMS 5-6-7

Fertilizer Treatment Lb. per Acre	Shelled Corn Yields, Bu. per Acre		
	Farm 5 Iowa 939	Farm 6 Ind. 608C	Farm 7 Ind. 608C
8–10–10 500 plowed under 3–12–12 125 drill row	95.8	88.6	86.7
None plowed under Farmer's fertilizer 125 in drill row	86.9	78.4	71.2
Gain over farmer's practice	8.9 10%	10.2 13%	15.5 20%

Lespedeza Is Not a Poor Land Crop

(*From page* 8)

Lespedeza finds wide use as a pasture plant. It thrives in hot weather and makes the greatest growth during the summer months when pasture grasses are more or less dormant.

several varieties of annual lespedeza. In each case, lime was applied prior to seeding at the rate of one ton of ground dolomitic limestone to the acre. Lime was applied at the same rate per acre every fourth year thereafter. All plots received annually at planting 400 lbs. of an 0-12-12 fertilizer to the acre. Four annual varieties were tested, namely: Korean, Kobe, Tennessee No. 76, and Common.

Korean lespedeza gave the highest yield of hay per acre for the early dates of seeding. Kobe was the next best variety tested at each location. In the western half of Virginia, lespedeza usually is seeded from February 15 to March 15; while in the eastern part of the State it usually is seeded from January 15 to March 15. Korean lespedeza seed was found to germinate more rapidly than the seeds of other varieties. It made more early growth and covered the land more quickly than other varieties, thereby suppressing the growth of grass and weeds.

Conflicting evidence obtained from farmers as to the response of lespedezas to liming suggested the possibility of a difference in the lime requirements of different varieties. An experiment therefore was started in 1934 to determine whether there was a difference in response of the different varieties to lime. At Chatham, lespedeza was grown on Cecil sandy loam soil, which had a low supply of soluble calcium. Lime was applied in 1934 prior to seeding at the rate of two tons of ground dolomitic limestone per acre and again in 1937 at the rate of one ton per acre, with and without fertilizer. The yield of all varieties (average of 7 years) was increased markedly from the use of lime without fertilizer on Cecil sandy loam soil at Chatham.

The yield of the Korean variety *(stipulacea)* was increased 582 lbs. per acre more than that of any of the other varieties *(striata)*. This response was consistent regardless of the fertilizer treatment. At Holland, lespedeza was

grown on Onslow fine sandy loam soil which had a medium supply of soluble calcium. Although the relative response to liming was much less on the Onslow than on the Cecil soil, the response from the varieties representing the two species was the same in each case. In practice, it would be advisable for farmers to lime for all of the annual varieties of lespedeza on very acid soils (pH 5.5 and below); but on soils of medium acidity (about pH 6.0), liming would not be important except for the Korean variety.

Experiments have been carried out at several places in the State and on several soil types to determine the response of lespedeza to applications of fertilizer. In each case lime was applied, prior to seeding, in sufficient quantities to adjust the soil reaction to approximately pH 6.0. Lime was applied every fourth year; and thereafter, at the rate of one ton per acre. Fertilizers were applied annually at the rates indicated in tables 3 and 4.

Applications of lime to Cecil sandy loam, at Chatham, increased the yield of lespedeza hay 948 lbs. to the acre (table 3). Phosphoric acid gave an additional increase in yield of 579 lbs. Potash, when used with phosphoric acid, gave an additional increase in yield of 1,013 lbs. The use of nitrogen with phosphoric acid and potash gave only a slight additional increase in yield.

Applications of lime (2-year average) to Onslow fine sandy loam, at Holland, increased the yield of lespedeza hay only slightly (table 4). The use of phosphoric acid increased the yield 465 lbs. to the acre, while potash without phosphoric acid increased the yield 960 lbs. Potash, when used with phosphoric acid, gave an increase in yield of 1,140 lbs. to the acre.

At Staunton, the application of lime to Berks silt loam soil gave an increase in yield of lespedeza hay of 1,720 lbs. to the acre (4-year average). Phosphoric acid increased the yield 540 lbs. to the acre. Potash increased the yield 270 lbs. to the acre. However, the greatest increase in yield due to the application of potash was obtained when it was used with phosphoric acid —resulting in an increase of 740 lbs.

TABLE 3.—THE EFFECT OF LIME AND FERTILIZERS ON THE YIELD OF LESPEDEZA, AT CHATHAM (AVERAGE FOR 7 YEARS)

Fertilizer treatments	Yield
	Pounds
None	2351
Lime	3299
500 lbs. 0–16– 0 + lime	3878
500 lbs. 0–16–10 + lime	4891
500 lbs. 4–16–10 + lime	5019

TABLE 4.—THE EFFECT OF LIME AND FERTILIZER TREATMENTS ON THE YIELD OF LESPEDEZA

Fertilizer treatments	Yields of air dry hay in pounds per acre		
	Holland	Staunton	Glade Spring
	Pounds	Pounds	Pounds
None	1975	980	2091
Lime	2090	2700	2565
400 lbs. 0–12–0 + lime	2555	3240	2934
400 lbs. 0–0–12 + lime	3050	2980	2782
400 lbs. 0–12–12 + lime	3695	3980	3206

Applications of lime to Dunmore silt loam soil at Glade Spring increased decidedly the yield of lespedeza hay (7-year average). The use of either phosphoric acid or potash increased the yield markedly. However, the greatest increase in yield due to the application of potash was obtained when it was used with phosphoric acid.

The data presented in tables 3 and 4 clearly show that the yield of annual lespedezas was markedly increased by applications of potash and phosphoric acid and lime. Therefore, it is suggested that where the annual lespedezas are to be grown, a soil reaction of pH 5.8 to 6.0 be maintained by the use of lime when necessary, and a fertilizer containing both phosphoric acid and potash be used. An application of either an 0-12-12 or 0-14-7 fertilizer at the rate of 300 to 400 lbs. to the acre will meet the usual fertilizer requirements for lespedezas in Virginia.

Plow Pushers

(*From page* 5)

penses and government bonds and taxes are paid. In cases where the jack pot goes into the common family fund, there will not be quite as much bad feeling when the veterans return.

Yet this situation was so interesting to me that I inquired deeply of a few former farm workers what they felt and experienced in their industrial tasks. I wanted to get some actual personal reactions among those who had been attracted from agriculture into the high-pay assembly lines.

I found a majority of the younger workers from rural zones tending to be rather "cocky" about succeeding in new environment, and looking to this as a new and enriching experience. Samples of their spoken opinion may jar some of us rural-minded folks a trifle, but I give you just what they had to say and leave the verdict to readers.

In the two fifteen-minute rest periods in each eight hours of work accorded to industrial employes, some of them gave vent to strong remarks along this line.

Ethel, born and raised on a farm, said:

"It beats the farm galley-west. When I finished my high school course, I went to work for a neighbor farm woman at three dollars a week and board. I did everything the others did not want to do, besides my own job. I was up at 4:30 every morning, made kitchen fire, baked biscuits for breakfast, fried the eggs and potatoes, and got the meals for ten people. I washed, ironed, mended, cleaned calf pails and milk strainers, and washed dishes. I stayed there two years. The hired men got time off, but I never did. When I have saved a pile out of the war job, I'll get married and buy a little place and raise chickens and fruit."

John was a town boy who could not find city work and was sent by the employment office to a farm. He had never stayed overnight on a farm before and it was pretty lonesome at first.

"My wages were sixteen dollars a month, which the farmer told me was good money for a green lad, plus a bed, board, washing, and a chance to read his magazines. I stayed two years and when I asked for a raise, he replied that I was not a farmer and never would be —although I learned to milk, drive a tractor, and pitch hay. My boss raised Herefords with pedigrees, and his wife had 1,000 hens. I killed and dressed fifty birds a week and delivered them. Then the farmer's son quit home and went to work in a war plant—and believe me, I soon followed him."

Mike had a slightly different viewpoint. "They treated me well on the

farm; I had a nice room with a radio, and a bathtub of my own. But here I make as much in a week as I got in a month on the farm. I feel that the future of farming is imperiled unless something is done, but I don't know what. There isn't a farmer in the county who can pay more than fifty dollars a month to a hired man, and such men go where they can make fifty a week. Maybe it's the fault of the unions, I don't know and it's not my job to find out."

Lilly had been an employer on her father's farm herself, trying to make ends meet and getting enough help to carry on. "My apples spoiled last fall because I couldn't get pickers, but my neighbor picked, boxed, and shipped one-tenth of the crop alone. Things got so tough that I got rid of all my stock and equipment, turned the key in the door, got me a job and a hotel room at twelve dollars a week, and I make sixty-five cents an hour. Here I live like a queen—no worry about linen, towels, laundry, food, or leisure. I have put my place up to rent and maybe I can sell it—if somebody can find help enough."

"I SOLD everything at auction and moved to town," said Arnold. "My two sons are in the navy and one daughter is a nurse. I wouldn't stand in their way at such a time; and if I had demanded that they stay on the farm, things would have been unsettled and uneasy. I lost two hired men who got fifty-two dollars a month. One went into a factory and the other was drafted. My oats stood in rain and rotted. My cows fell off in milk flow. The employment office sent me some city boys and girls, who did their best, but it wasn't good enough. That's why I'm here."

Andy had something to say, too. "Too much abuse is piled on country youngsters. Folks say they leave the farm and go to work in town for big wages and take it easy while the town boys and girls are asked to come out to the farm and try their hand at unaccustomed tasks at small wages. Society tolerates this condition, but it began when the auto boom started and has been growing yearly. It isn't just a wartime condition. Only the war increased the difference in opportunity for young folks."

Emancipation from long hours and loneliness and the chance to earn good money seem to sum up the case for the "escapists." Is it really true that after all the energy and thought that extension leaders have put upon 4-H clubs and social betterment, we still have so little tangible hold on the agricultural life? Or are these opinions only the excuse of those who must return to their former mode of life when the gilt edge is gone and the boom is burst?

Would the cure be found, as some aver, in allowing the market prices for foodstuffs and agricultural raw materials to advance under unrestricted terms? That is, would it be possible for farmers to earn enough that way to meet the competitive cost situation we hear so much about?

Is it safe to assume that we can advance farm and food prices without subsidies to a point where the inequality of opportunity between town and country can be eliminated?

My opinion is that this is doubtful. We have so many consumers of food who have not benefited by higher war wages and who are burdened with taxes; and we have the government taking out such a large slice of the production. This and the natural upward tendency of industrial wage demands whenever food costs rise unduly —these things make me hesitate to find a solution that way.

BUT I am no economist. If I were I would be ordering you around instead of bothering you with problems.

If you were to get the job of solving the plow-pushing problem, what would you do? What would be your recommendation? So with this buck-passing I leave you, hoping to get a few letters that will give me a hunch for another poser.

A MAN'S BUSINESS

"At any rate," said the auctioneer, "mine is a business that a woman can't take up."

"Nonsense," put in the strong-minded lady. "A woman would make quite as good an auctioneer as any man."

"Would she?" retorted the other. "Well, you try and imagine an unmarried lady standing up before a crowd and saying, 'Now, gentlemen, all I want is an offer'."

"I know that soldier is the man for me, mother. Every time he takes me in his arms I can hear his heart pounding."

"Better be careful, daughter! Your pa fooled me that way for almost a year with a dollar watch."

Chinese visitor says: "Funny people, you Americans. You take a glass—you put in sugar to make it sweet and lemon to make it sour; you put in gin to warm you up and ice to keep you cool—you say 'Here's to you,' and then you drink it yourself."

THE HARD WAY

"But surely you did not tell him straight out that you love him?"

"No fear, he had to squeeze it out of me."

GOB HUMOR

"I'm getting so I like that guy less and less."

"Why?"

"He's the kind of guy who, when he pours you a drink and you tell him to stop, stops."

Visitor: "Don't you cut yourself pretty often with this straight-edged razor?"

Mountaineer: "Nar. I been shaving nigh on to five years now and I ain't cut myself either time."

RIGHT AT HOME

Sergeant: "Did you give the prisoner the third degree?"

Policeman: "Yes, we browbeat him, badgered him and asked him every question we could think of. He merely dozed off and said, 'Yes, dear, you are perfectly right'."

Young Man: "I think two can live as cheaply as one."

Future Father-in-law: "You can't edge into my family on that theory, young man. I'm willing to keep supporting my daughter, but you'll have to pay board."

Modern aim: Acquiring new land for surplus populations who are slain in the process.

Critics—people who go places and boo things.

"What do you call it when one woman is talking?"

"A monologue."

"And when two women talk?"

"A cat-alogue."—California Dairyman.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Potash Pays on Grain (South)
Greater Profits from Cotton
Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Grow More Corn (South)
Fertilizing Small Fruits (Pacific Coast)
Potash Hungry Fruit Trees (Pacific Coast)
Fertilize Potatoes for Quality and Profits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
The Cow and Her Pasture (Northeast) and (Canada)
Fertilize Pastures for Better Livestock (Pacific Coast)
What You Sow This Fall (Canada)
Home-grown Grains for Profitable Hogs (Canada)
What About Clover? (Canada)
Of Course I'm Interested (Pastures, Canada)

Reprints

B-8 Commercial Fertilizers in Grape Growing
K-8 Safeguard Fertility of Orchard Soils
T-8 A Balanced Fertilizer for Bright Tobacco
CC-8 How I Control Black-spot
II-8 Balanced Fertilizers Make Fine Oranges
MM-8 How to Fertilize Cotton in Georgia
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N-9 Problems of Feeding Cigarleaf Tobacco
T-9 Fertilizing Potatoes in New England
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DD-9 Some Fundamentals of Soil Management
KK-9 Florida Studies Celery Plant-food Needs
MM-9 Fertilizing Tomatoes in Virginia
PP-9 After Peanuts, Cotton Needs Potash
UU-9 Oregon Beets and Celery Need Boron
A-2-40 Balanced Fertilization For Apple Orchards
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
H-3-40 Fertilizing Tobacco for More Profit
J-4-40 Potash Helps Cotton Resist Wilt, Rust, and Drought
Q-5-40 Potash Deficiency in New England
S-5-40 What Is the Matter with Your Soil?
T-6-40 3 in 1 Fertilization for Orchards
AA-8-40 Celery—Boston Style
CC-10-40 Building Better Soils
GG-11-40 Raw Materials For the Apple Crop
JJ-12-40 Fertilizer in Relation to Diseases in Roses
A-1-41 Better Pastures in North Alabama
E-2-41 Use Boron and Potash for Better Alfalfa
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K-4-41 The Nutrition of Muck Crops
L-4-41 The Champlain Valley Improves Its Apples
Q-6-41 Plant's Contents Show Its Nutrient Needs
R-6-41 A Balanced Diet for Nursery Stock
U-8-41 The Effect of Borax on Spinach and Sugar Beets
W-8-41 Cotton and Corn Response to Potash
Y-9-41 Ladino Clover Makes Good Poultry Pasture
Z-9-41 Grassland Farming in New England
BB-11-41 Why Soybeans Should Be Fertilized
DD-11-41 J. T. Brown Rebuilt a Worn-out Farm
EE-11-41 Cane Fruit Responds to High Potash
GG-12-41 Borax Helps Prevent Alfalfa Yellows in Tennessee
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C-1-42 Higher Analysis Fertilizers As Related to the Victory Program
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U-6-42 Water, Fertilizer and Good Farming
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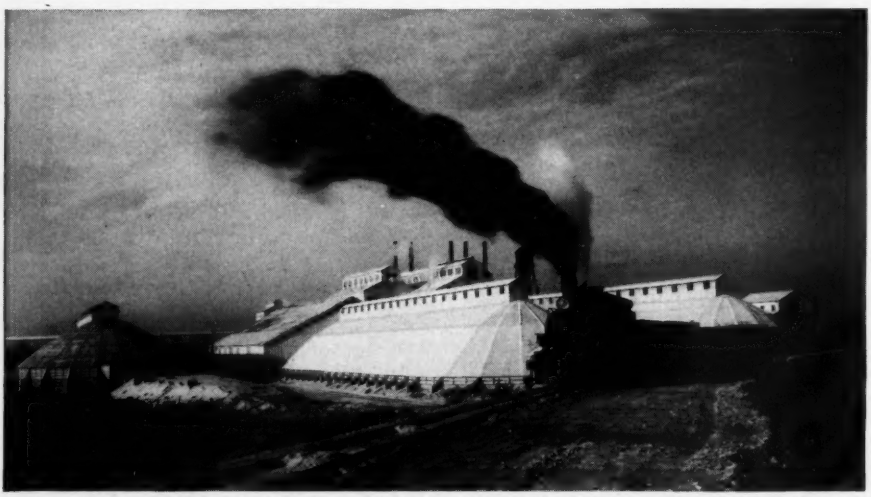

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